Table 5-2. Construction and Project Controls Observations and Recommendations	
No.	**Description**
	topic on chemical labeling was perhaps too complex.) • At the daily morning safety briefing, each craftsman is required to sign the morning bulletin. This probably takes 15 minutes for the crew to sign the bulletin which is 15 minutes the craft is not at the work face. The need for signatures should be re-evaluated.
CPC22	Observation(s) • The current work package procedure requires the craft foreman (or his designee) to check out the work package each morning and return it to document control each night. If changes have occurred in the last 24 hours it is on hold until field engineering updates it. The work packages must be at the work face during work activities. Some work packages are hundreds of pages long and they contain all related drawings, drawing changes and specifications. A significant amount of time is lost each day implementing the work package process. • Some work packages contain three volumes, some of them over three inches think. The foreman only needs a small amount of this paperwork to perform his daily tasks. Recommendation(s) • Assign a team to review and streamline the work package process. One change might be having the responsible field engineer hold the work package and only issue the relevant drawings (and changes) and inspection, hold points, and signoff sheets to the foreman. • At a minimum, incorporate the design changes into the construction drawings before the craft start work. (It is time consuming for the foreman to refer to multiply design change documents when trying to execute the work). Remove the specifications and standard details from the packages given the foreman, they can be referenced and copies kept in the field stick file trailers. The work packages should only include what is needed by the foreman for their work.
CPC23	Observation(s) Normally, the bulk commodity installation curves are somewhat parallel with the civil work in advance of the piping which is in advance of the electrical work. On the V.C. Summer project, the curves do not parallel each other with some electrical work crossing piping. The time between commodity installations does not appear sufficient to allow installation of bulks in an efficient manner. Recommendation(s) • Adjust the schedule for the bulk installation of commodities to allow enough time between work activities to achieve an efficient and cost effective installation program.
CPC24	Observation(s) • The monthly progress report shows construction progress advancing approximately 0.5% per month with a total to date (August 2015) of 21% complete. In order for the plant to complete on schedule, monthly construction progress must increase to close to 3%. There are several work faces without craftsmen, (examples: Unit 2 turbine building elevated slabs; the Unit 3 containment only had 100 men working, and no work in the Unit 3 turbine building.) • It takes approximately one hour before the craftsmen get to their workplace. At both of the coffee breaks and lunch time, the craftsmen leave the work area resulting in unproductive time leaving and returning to work.

Table 5-2. Construction and Project Controls Observations and Recommendations	
No.	**Description**
	Recommendation(s) • The project needs to staff up to work all available work faces. • Assign a senior construction person to evaluate methods to have the craftsmen spend more time at the workface (One example: move the tool boxes into the building near the work area.) • Have coffee breaks and lunch in the work areas.
CPC25	Observation(s) The Consortium's Integrated Project Schedule has 50 mandatory constraints--20 associated with Unit 2, 24 associated with Unit 3, and six site-specific. • A majority of the mandatory constraints affect fabrication of shield building panels that are forecast for later deliveries from the fabricator, the latest being for Unit 2 149'-6" transition panels currently forecast to be complete 9 months later than the constrained date. The Consortium stated during the September 9, 2015 presentation that a mitigation plan is in process for the shield building panels. • There is a constraint on the Unit 2 auxiliary building R251 module that is currently forecasted to be complete 5 months later than the constrained date. • There is a constraint on the Unit 3 CA01 module ready to lift that is currently forecasted to complete 4 months later than the constrained date. • There is a constraint on the Unit 3 CA20 module ready to lift that is currently forecasted to complete 4 months later than the constrained date. Recommendation(s) • Remove mandatory constraints, and allow the schedule to move based on the logic. Prioritize development of mitigation/recovery plans based on their potential impact to the schedule. Only incorporate mitigation plan recovery into the schedule after it has been fully developed and approved by all parties.
CPC26	Observation(s) The baseline forecast was developed based on a performance factor of 1.15. Recent (last 6 months) performance has been greater than 2.0 on Unit 2, and greater than 1.5 on Unit 3, primarily driven by civil building construction impacts. Recommendation(s) • Update the forecast based on recent performance. Reassess manpower needs based on updated forecast. • Implement a small sample of piping and electrical work packages well ahead of bulk installation period to assess potential impacts early. • Plan to ramp-up slowly, gradually, to achieve an acceptable productivity level, train leads, and identify challenges and impediments prior to ramping up to full bulk installation mode.
CPC27	Observation(s) The Owners' oversight organization does not have a proper Project Controls staff. Recommendation(s) • Hire an experienced project controls manager, lead planner, and lead cost engineer to perform analysis of the Consortium schedule and cost forecasts. • A separate set of tracking tools should be created by the Owner to provide verification of

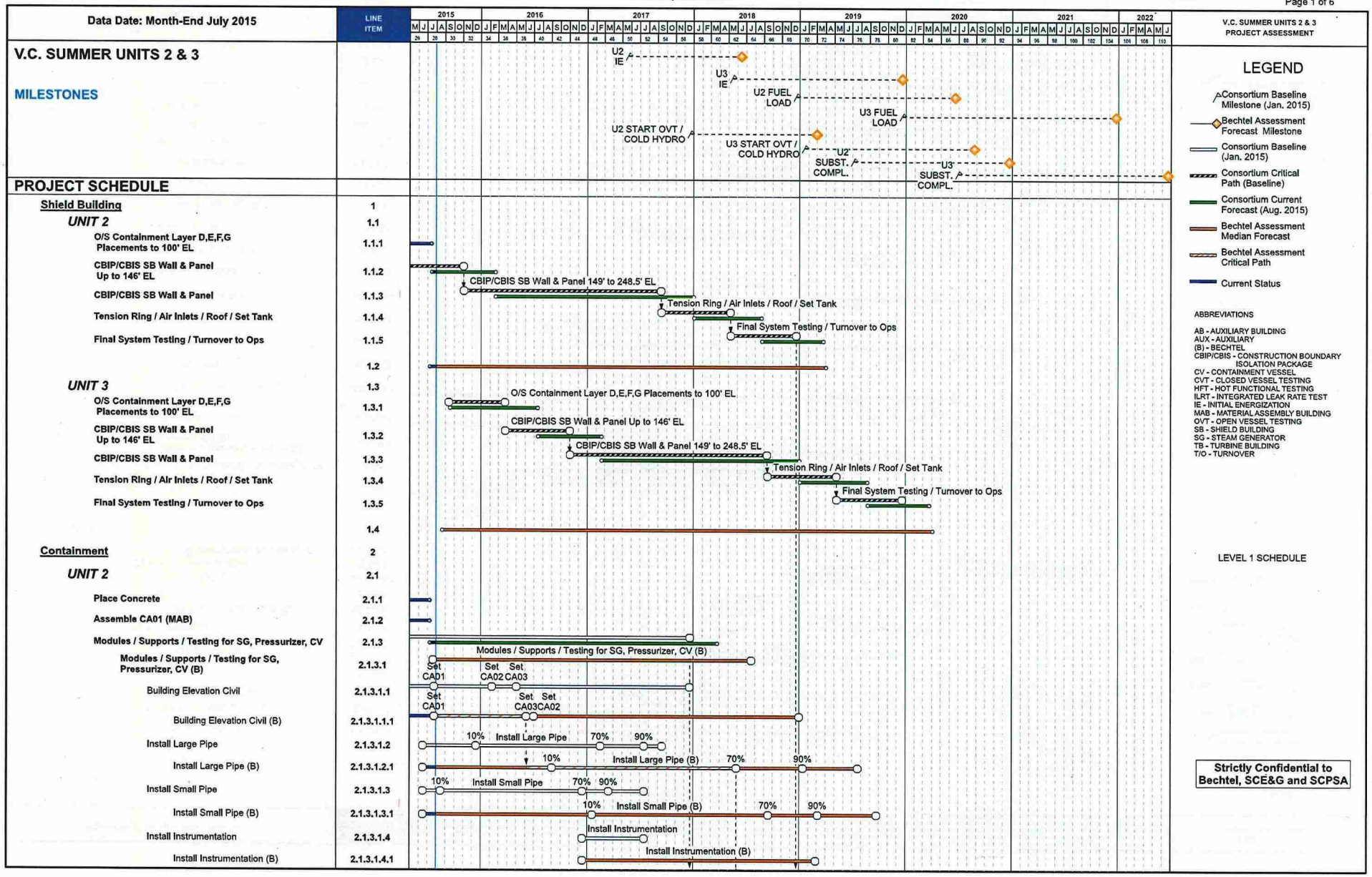
Table 5-2. Construction and Project Controls Observations and Recommendations	
No.	**Description**
	Consortium reporting. • Special attention needs to be made on the cost reimbursable portions of the scope. This newly formed Project Controls group would provide recommendations and identify areas requiring additional investigations.
CPC28	Observation(s) Consortium reports are provided in either a summary form or in an integrated manner making validation difficult. Recommendation(s) • Where contractually possible, the Owners should request the data that creates the reports not just the reports. The recommended Project Controls team would then analyze the data rather than just reviewing the report.
CPC29	Observation(s) The Consortium has narrowed focus into individual windows with a total horizon of around 9 months. The project reporting has followed suit and a majority of the reports provided focus upon this short time horizon. The reports to the Owners need to continue to be overall project focused. Recommendation(s) • Request all reports provided by the Consortium for the monthly meetings contain the overall view regardless of topic. Breakouts are acceptable and sometimes needed, but overall focus must remain on the overall project performance.
CPC30	Observation(s) Not all reports and or graphical representations provided within reports include the baseline and/or the Consortium's current forecast. Recommendation(s) • Request all reports provided to the Owners include both baseline information and a current forecast if different than the baseline. If the current forecast is later than the baseline, the Consortium should provide a recovery forecast plan. If cost is being discussed and the cost forecast exceeds the baseline, an estimate at completion should be required.
CPC31	Observation(s) Bechtel was told that the contract contains a portion of fixed price and cost reimbursable terms. The charging practice, if not tracked closely, could allow for improper cross charging between accounts. Recommendation(s) • Request staffing plans by position which account for the total project baseline budget for the tracking of jobhours. For the tracking of material type budgets, such as equipment or small tools, a baseline monthly usage plan should also be submitted for baseline tracking purposes. This document would serve as the basis for future negotiations and would provide enough detail for scope increase discussions and also validation of current actual charges.
CPC32	Observation(s) Schedule contingency has not been included within the integrated schedule.

Table 5-2. Construction and Project Controls Observations and Recommendations	
No.	**Description**
	Recommendation(s) • Analyze the schedule to identify activities within the critical and near critical paths that contain potential float. At the time of rebaselining the schedule, a schedule contingency analysis should be run and the desired probability of outcome should be agreed on.
CPC33	Observation(s) In reviewing the bulk piping curves, it was identified that the underground and aboveground commodities were included within the same chart. Tracking these together can be misleading especially when validating the sustained rates to ensure an achievable plan. Recommendation(s) • Separate the curves and track all underground quantities separate from aboveground quantities. Also, after creating separated curves, compare the current installation plan to historicals to validate their viability.
CPC34	Observation(s) While reviewing the bulk curves, it was identified that the bulk curves were not developed through the use of standard "S" shape curves. The "S" curves were altered to allow for additional time between the 10% and 90% completion windows to lower the sustained rates. This artificial increase in the sustained rate window reduces the sustained rate for comparison purposes but does not alter the real installation pace required to meet the plan. Recommendation(s) • Only use a standard "S" shaped work-off curve when evaluating the schedule duration viability.
CPC35	Observation(s) Bulk quantity installation curves reflect an overly aggressive plan when compared to Bechtel historical experience of peak sustained installation rates. Also, the separation of each commodity within the "family of curves" is not reflective of Bechtel historical experience. An example of this is the distance between the raceway and cable percent complete curves. The cable installation percent complete follows closely to the raceway installation percent complete. Historically, the more achievable plan reflects that a substantial portion of the installation of tray and conduit is complete prior to the commencement of cable pulling. This separation allows for pulls from point to point without having to coil at each end. Having to coil the cable rather than pulling to its final location creates additional hours due to double handling. Recommendation(s) • Create a new more achievable baseline Level 3 schedule. During development of the schedule, ensure appropriate time is allocated for bulk installation windows. • Update the schedule forecast based on median range of achievable peak sustained rate. • Review quantities by system, and align to the schedule and start-up system waterfall. Prioritize bulks by system turnover demands. Balance this priority with area releases, and methods that would allow the highest productivity to be achieved. Compare system driven quantity curve against peak sustained rate forecast, and adjust accordingly. • Plan work packages around the most productive methods of bulk installation (e.g., cable trees), with consideration for ability to support system turnovers.

Table 5-2. Construction and Project Controls Observations and Recommendations	
No.	**Description**
CPC36	Observation(s) • During the review and analysis of the quantities provided by the Consortium, it was identified that the total quantity of aboveground conduit appears to be high compared to Bechtel historicals. • Inversely, the total quantity for cable appears to be low. These quantities were also reviewed from a ratio perspective and result in an overall ratio unlike any of Bechtel's past projects. Recommendation(s) • Review the electrical quantities in the annex building and turbine building and update as needed. Revise the Level 2 and 3 schedules and also the bulk curves to align with the account for the new quantities.
CPC37	Observation(s) • The consortium project schedule is large and complex, forcing daily maintenance and status updates. Varying levels of the schedule are comingled in the same projects, and are loaded with varying degrees of resource data, resulting in duplication • The Level 1 schedule (as presented in the monthly project review meeting package) effectively highlights the critical path and major project activities on a single page. However, dates are only included for certain activities and a timescale is not provided, therefore target and forecast dates for other major activities are not clear. The schedule also appears to start in January 2015, showing no status of actual work completed prior to that date. • The Level 2 schedule is made up of "WBS summary" (work breakdown structure) type activities which are essentially hammock activities for all detailed activities within that WBS. This schedule provides a summary by unit, building, elevation, and commodity, and is fully resource loaded with jobhours through project completion. The Level 2 schedule appears to have many activities working in parallel, which isn't necessarily the case. When viewed at a lower level of detail, the Level 2 hammock (summary) activities capture all activities from fabrication through punch list and touch-up activities. In many cases, fabrication begins several months or more prior to installation, and there are also large gaps between bulk installation and final completion activities within a WBS (work breakdown structure). This approach skews the Level 2 activities into much longer durations than when the bulk of the work is actually planned to be performed. Furthermore, as the Level 2 schedule is fully resource loaded, this approach is spreading those resources over a longer period of time, reducing the resulting peak manpower requirements. This can be problematic if the Level 2 schedule is the primary tool being utilized to determine manpower requirements. • The Level 3 schedule is the detailed working level schedule for the project. Development of this schedule is ongoing, and is currently being reviewed at 6 to 9 month durations beyond the data date. Due to the level of detail and number of activities in this schedule, this schedule is considered to be a Level 5 implementation schedule. Resources are being loaded in this schedule as well as some quantities, but do not appear to be complete enough to be used for forecasting purposes. The Consortium's project controls group is performing daily reviews of this schedule due to its large size and complexity, and the volume of changes being input on a day-to-day basis. The team has established a good process for managing the existing schedule, but daily updating and reviews are excessive for this size and scope of project. Recommendation(s)

Table 5-2. Construction and Project Controls Observations and Recommendations	
No.	**Description**
	• Adjust the Level 1 schedule to include a time-scaled baseline and target and forecast dates for all identified activities. Expand the start of the window schedule to show major project status since project inception. • Create a Level 3 control schedule with no more than 5,000 activities per unit. The Level 2 schedule can be used at a starting point, but would need to be converted to "task" activities as opposed to "hammock activities". The Level 3 schedule should be at a sufficient level of detail to identify all critical interfaces between each phase of the project. The recommended structure is to identify construction activities by unit, building, elevation, area, and commodity. A custom data field should be added to identify systems associated with each activity, to ensure proper tie in from construction to startup. This schedule should be resource loaded with key quantities and jobhours and maintained/aligned to the current forecast for the project. Weekly meeting and management reviews should use this Level 3 schedule as opposed to lower level schedules. • Develop more detailed Level 5 implementation schedules as needed to manage near term commitments for critical areas. These can be in Excel rather than Primavera, and in addition to time-scaled format, can be in the form of a bingo-sheet, checklist, or other method to track status. Primavera is currently over-used for this level of the schedule, demanding more maintenance, update, meetings, etc., that strain project resources.

Figure 5-1. V.C. Summer Units 2 & 3 Project Assessment
Summary Schedule



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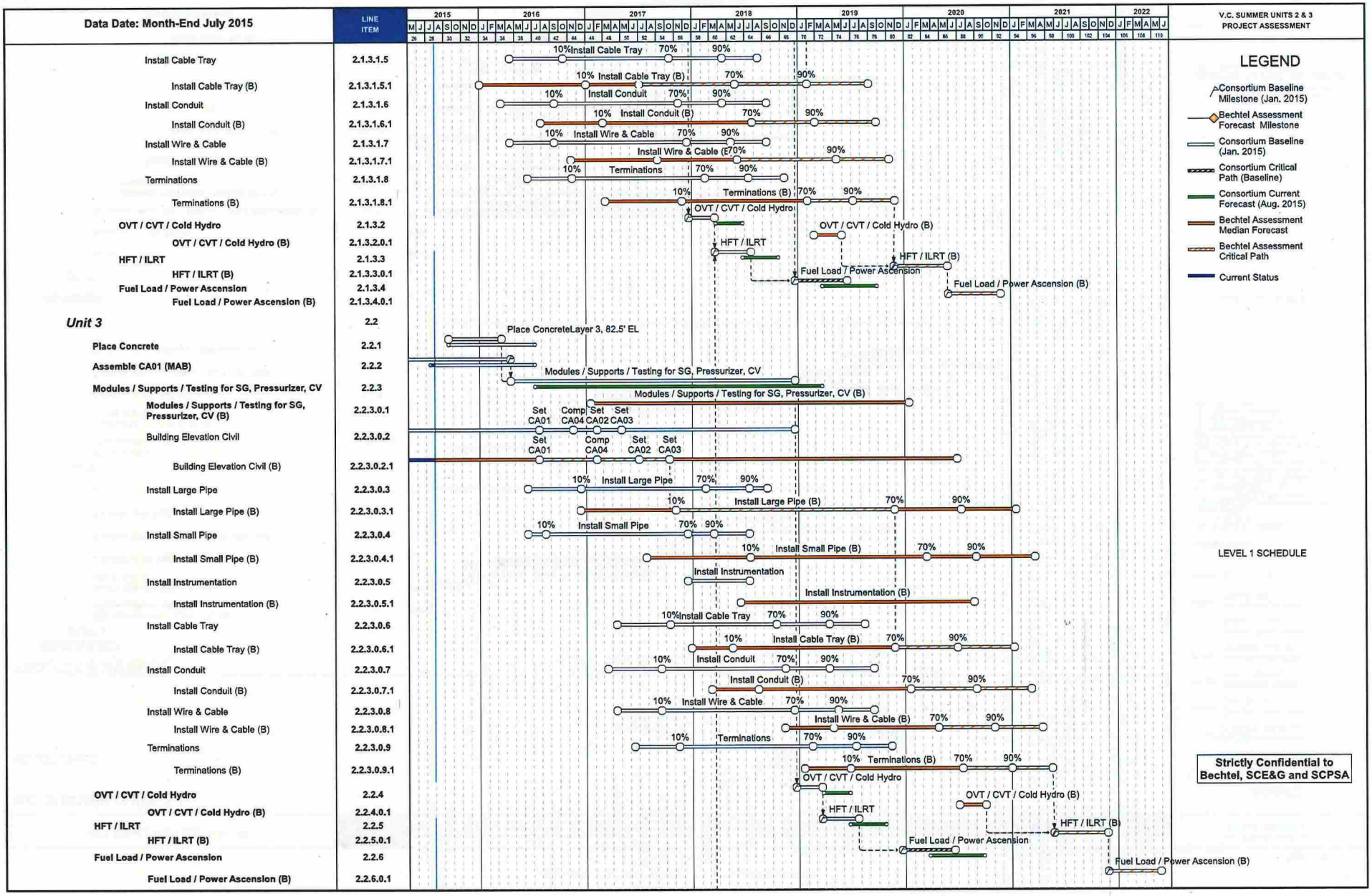

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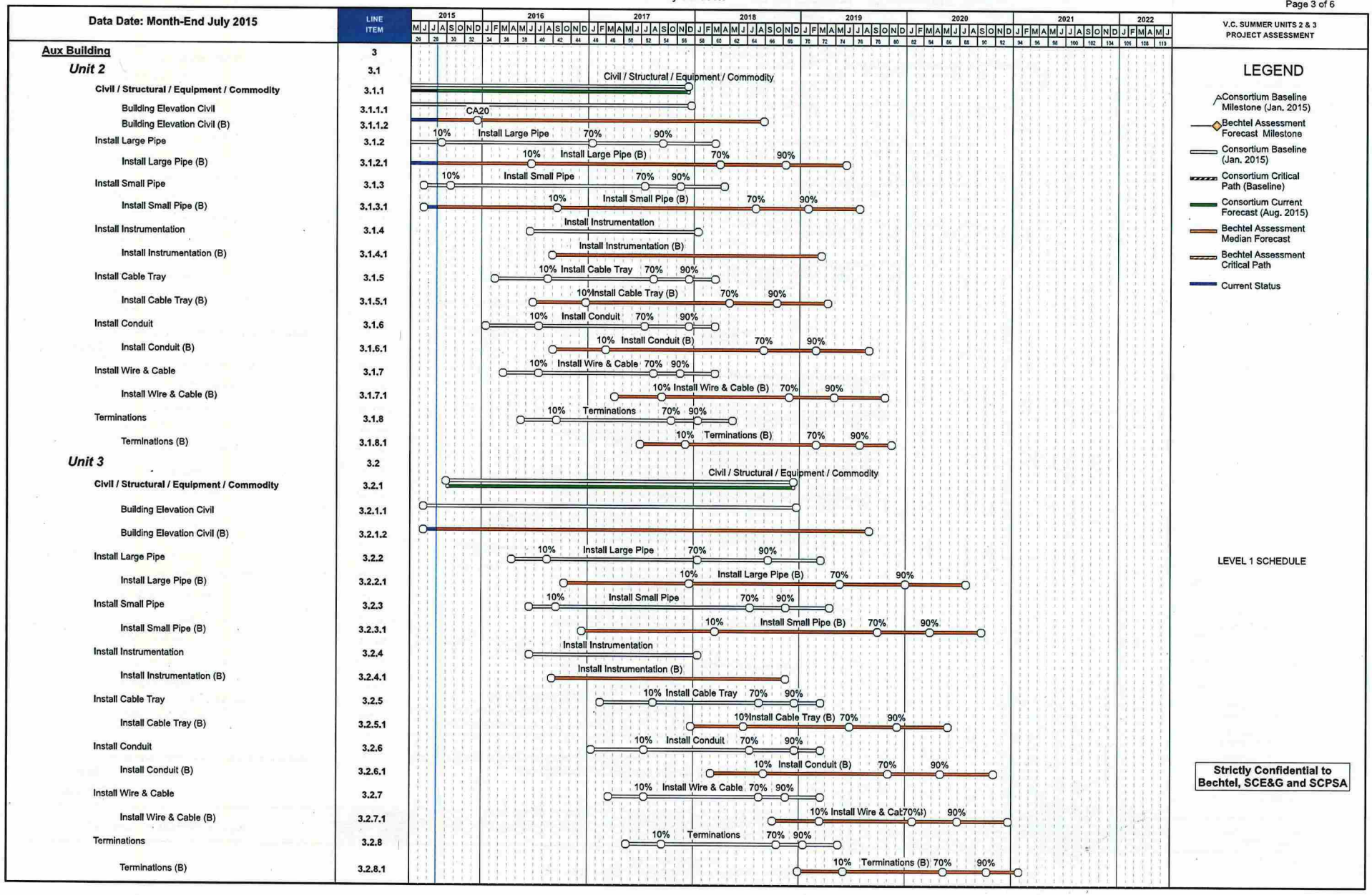

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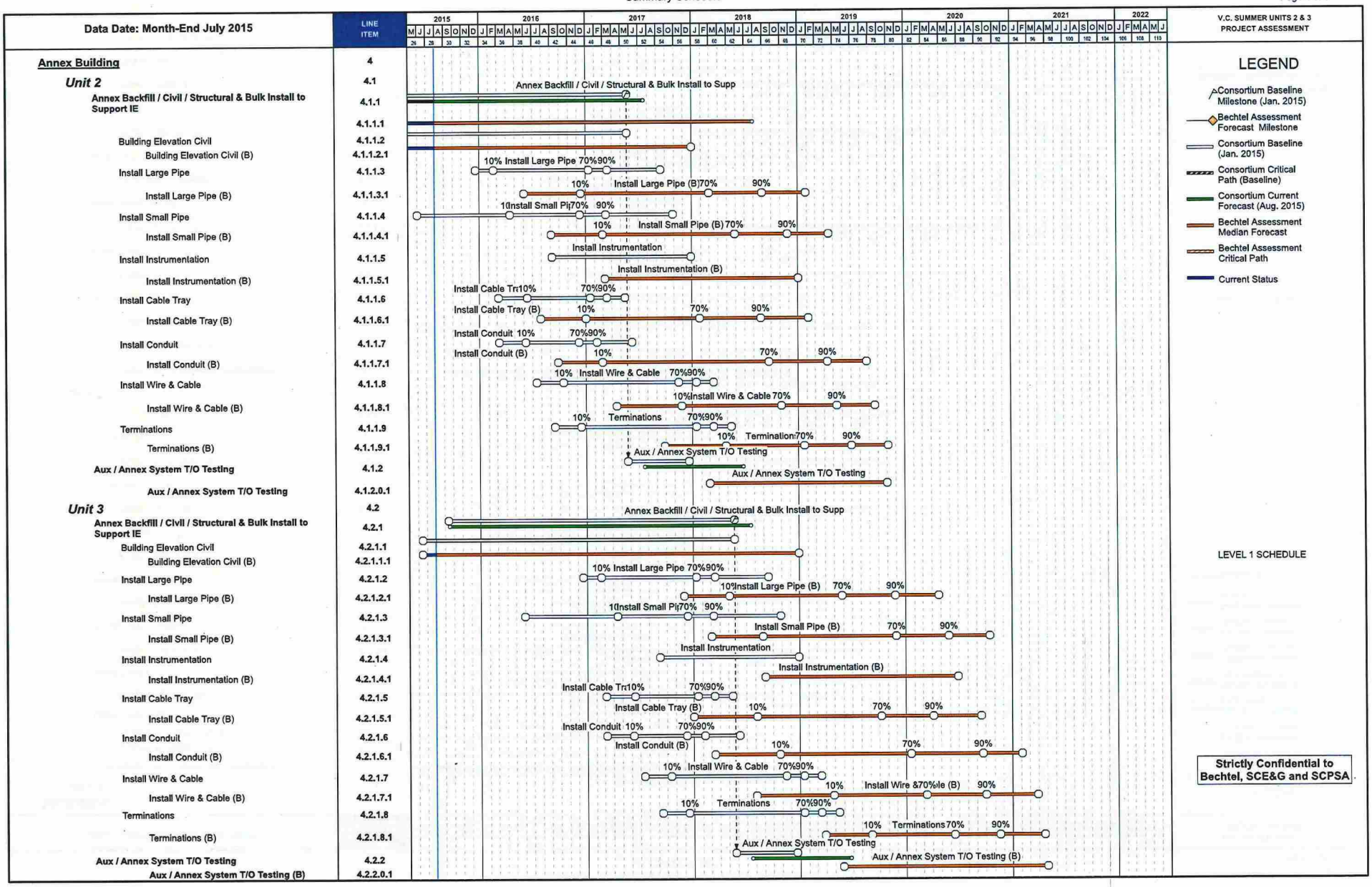

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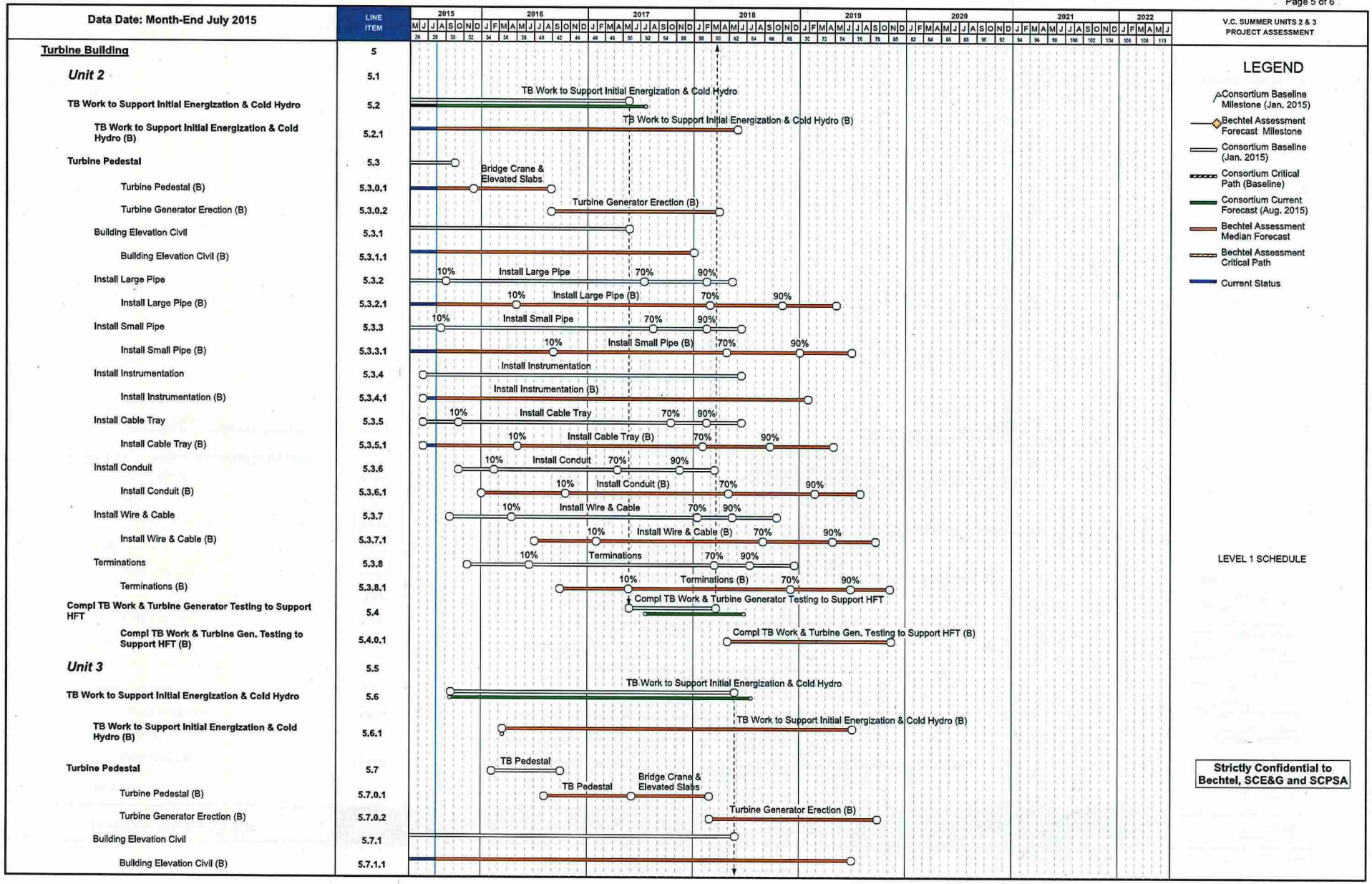

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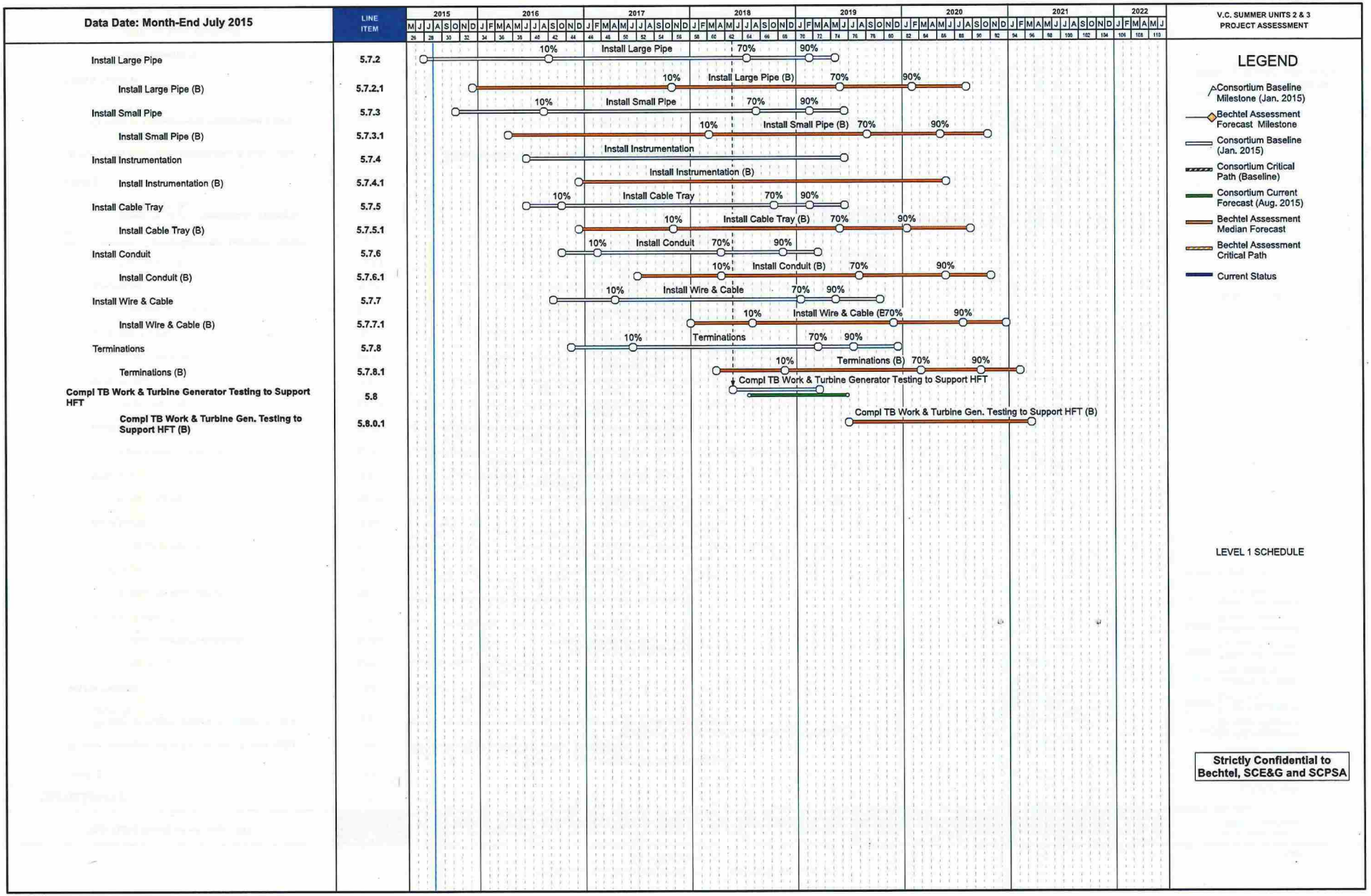

Draft November 9, 2015

Figure 5-2. Unit 2 Midpoint Forecast - Total Family of Curves

Sheet 1 of 1

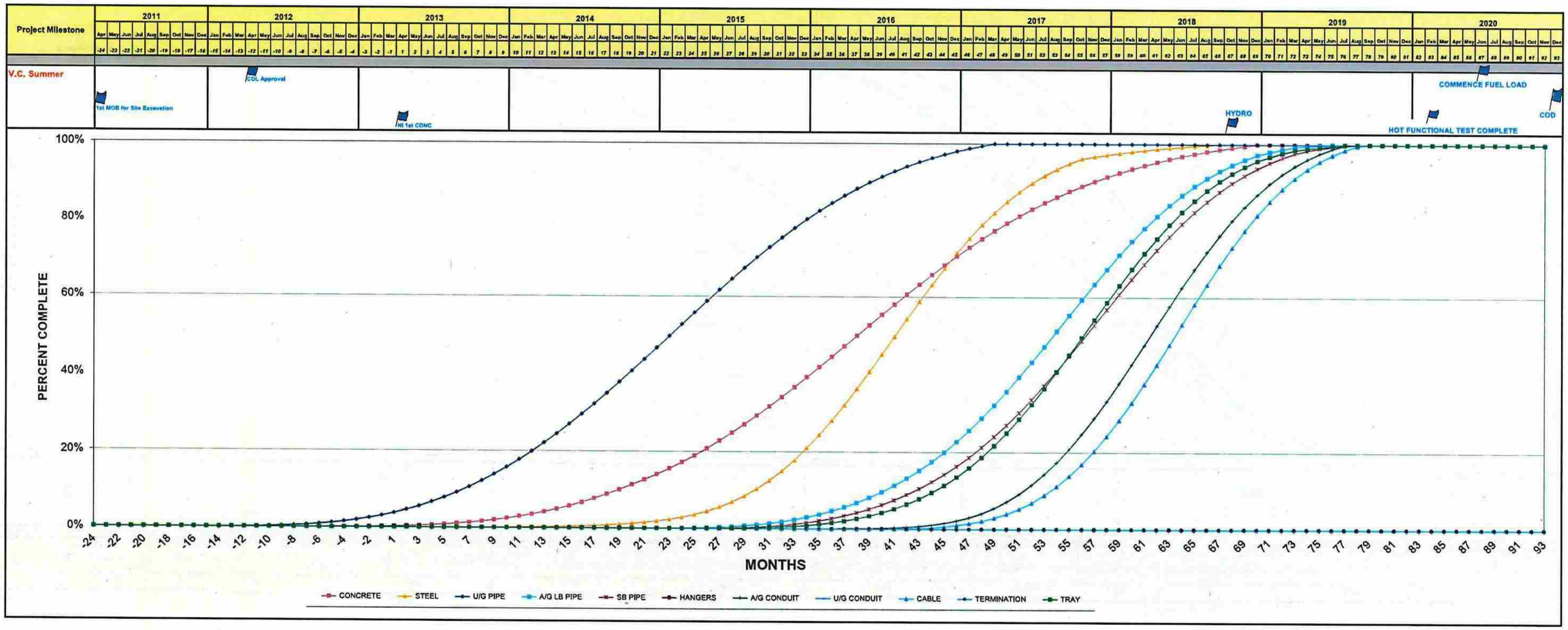

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Figure 5-3. Unit 2 Midpoint Forecast - Nuclear Island Family of Curves

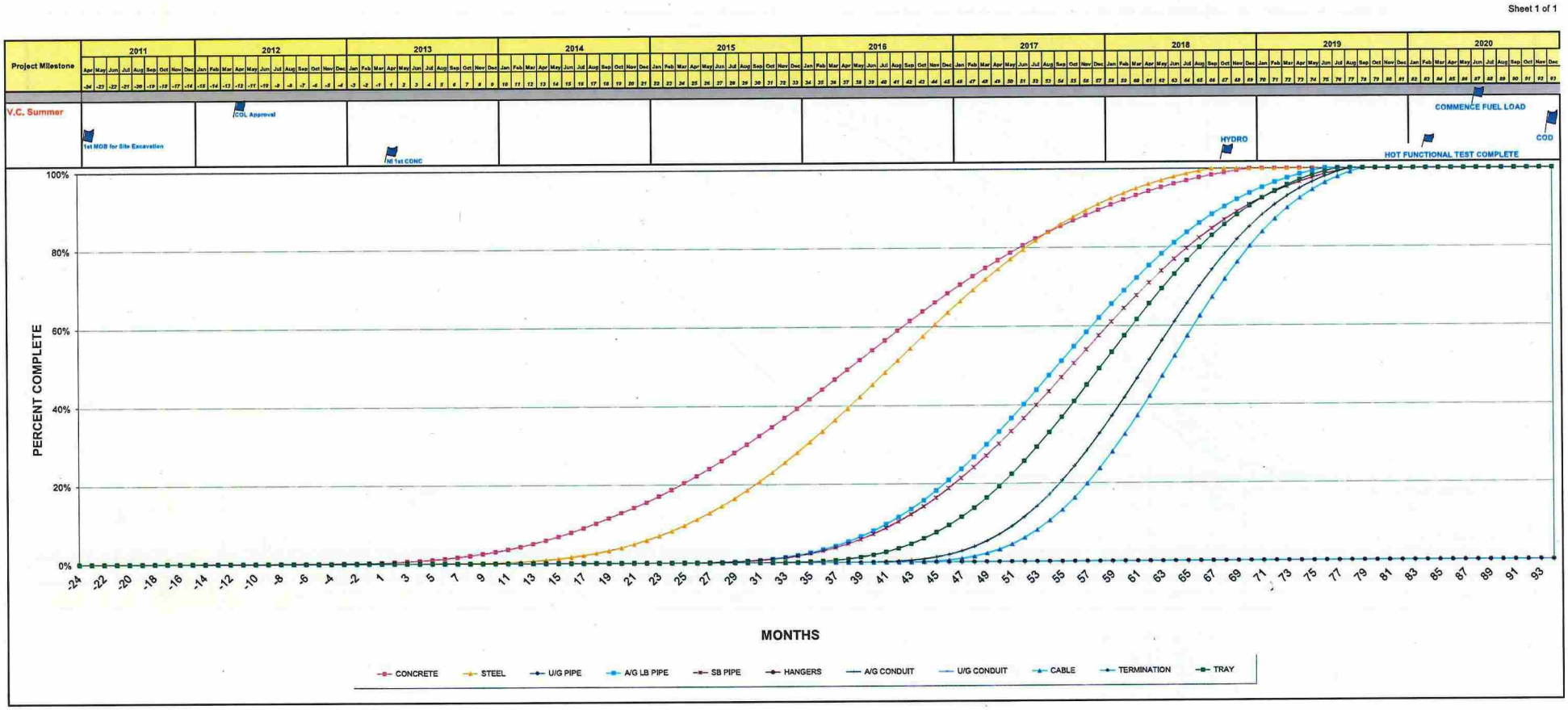

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Figure 5-4. Unit 2 Midpoint Forecast - Turbine Island Family of Curves

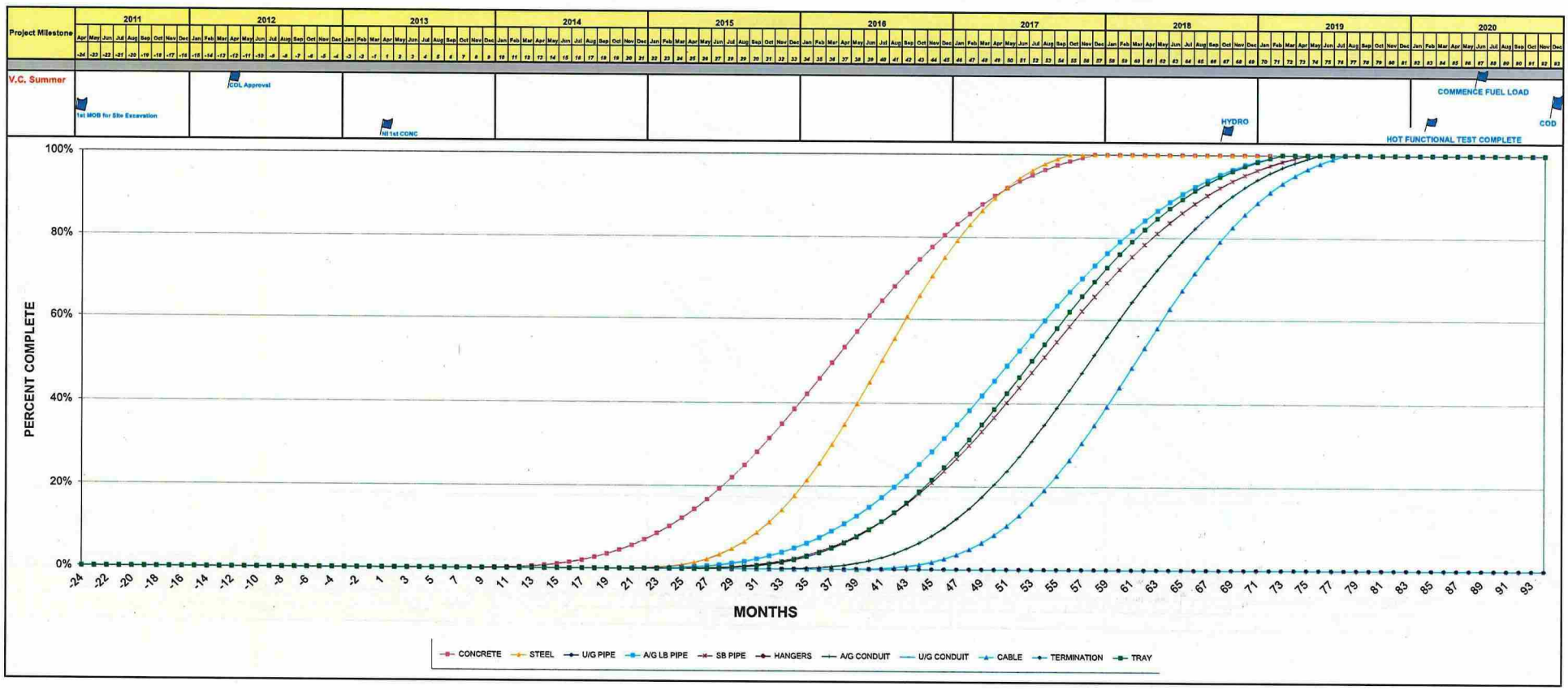

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Figure 5-5. Unit 2 Midpoint Forecast - Balance of Plant Family of Curves

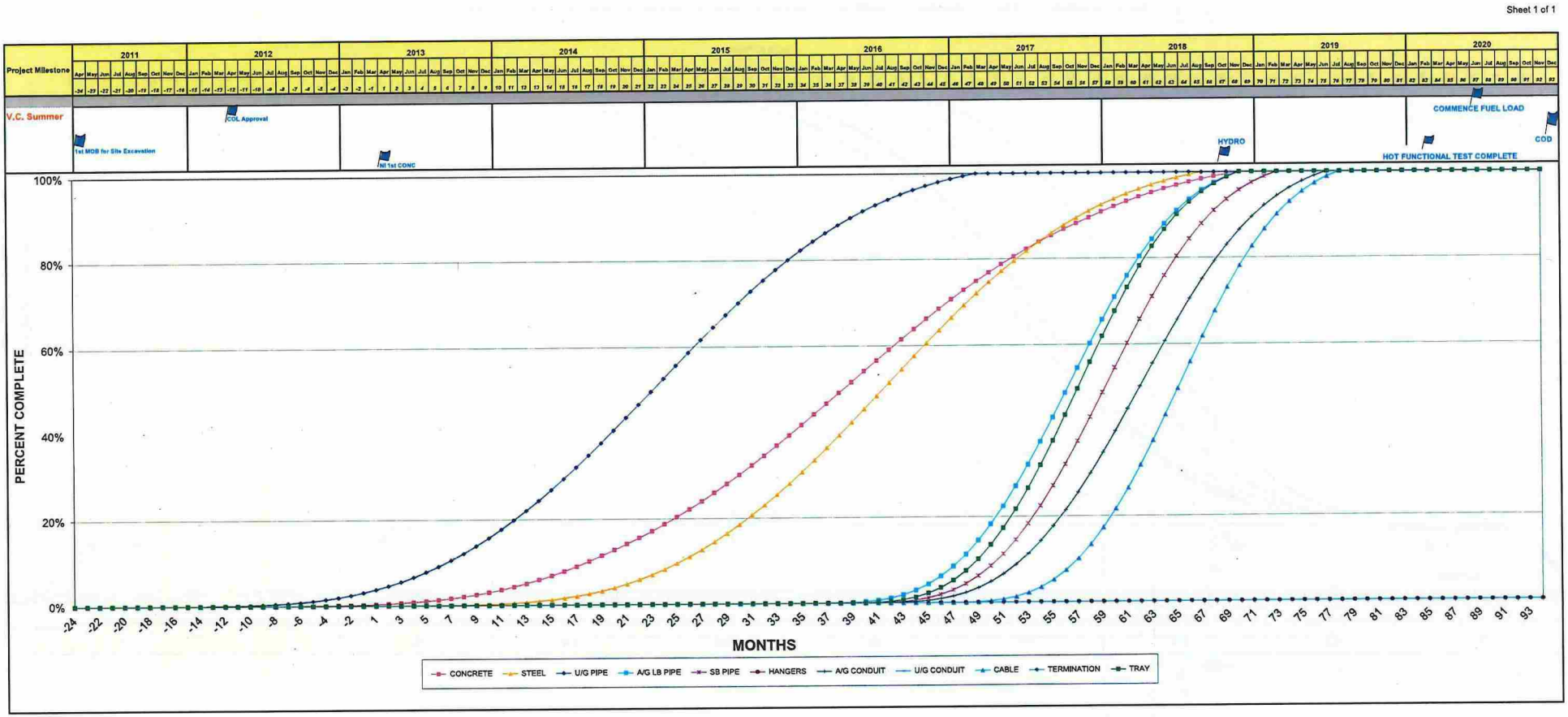

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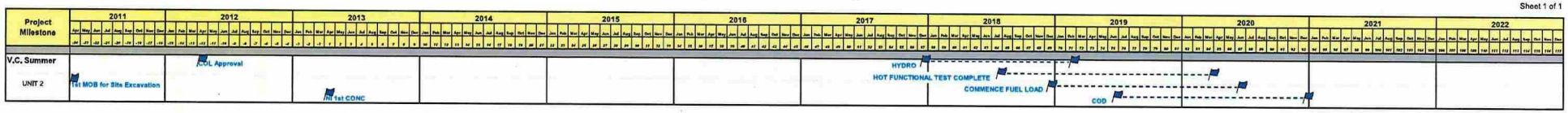
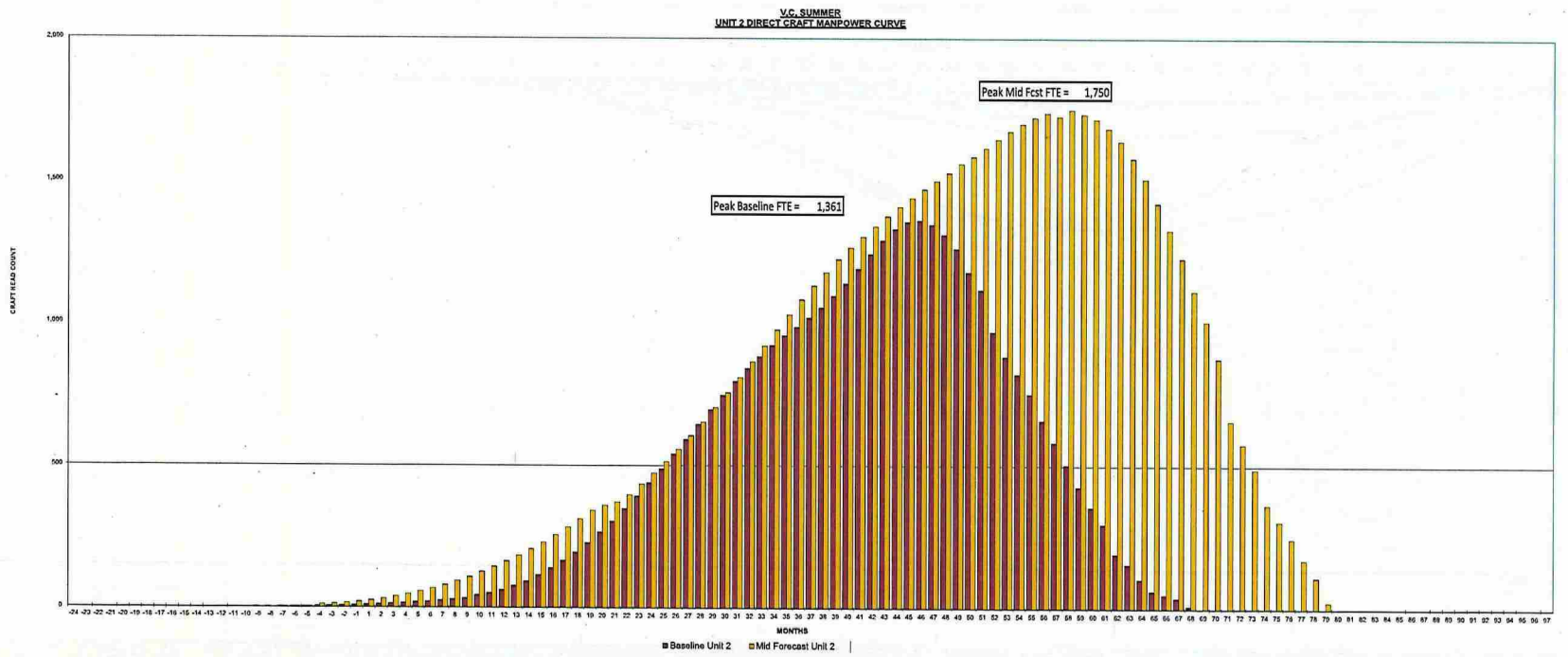
Figure 5-6. Unit 2 Direct Craft Manpower Curve and Percent Complete Curve





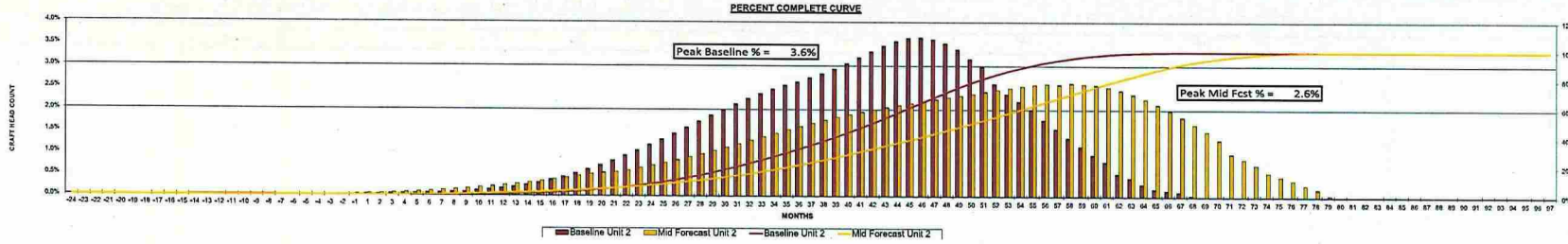


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Figure 5-7. Unit 2 Headcount by Craft (Does not Incl S/C Hrs)

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Sheet 1 of 1

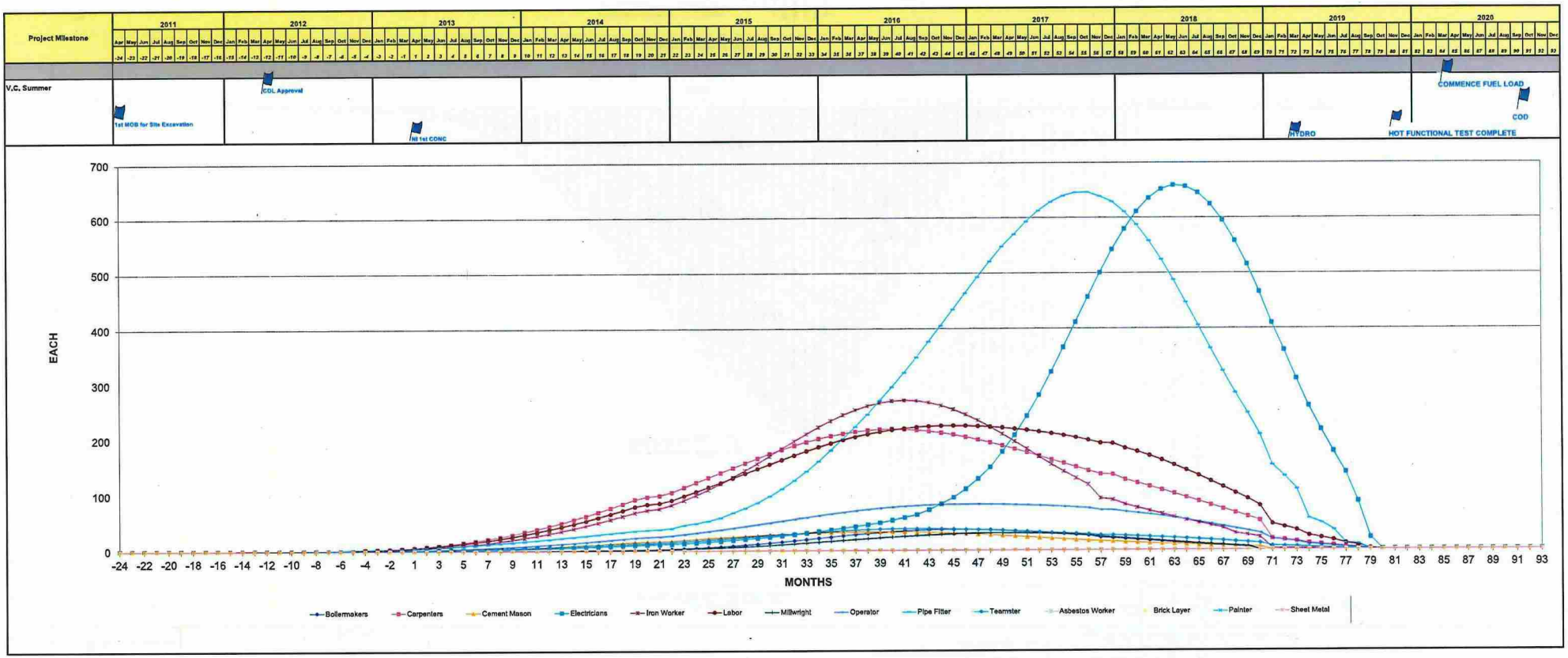

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Figure 5-8. Unit 3 Direct Craft Manpower Curve and Percent Complete Curve

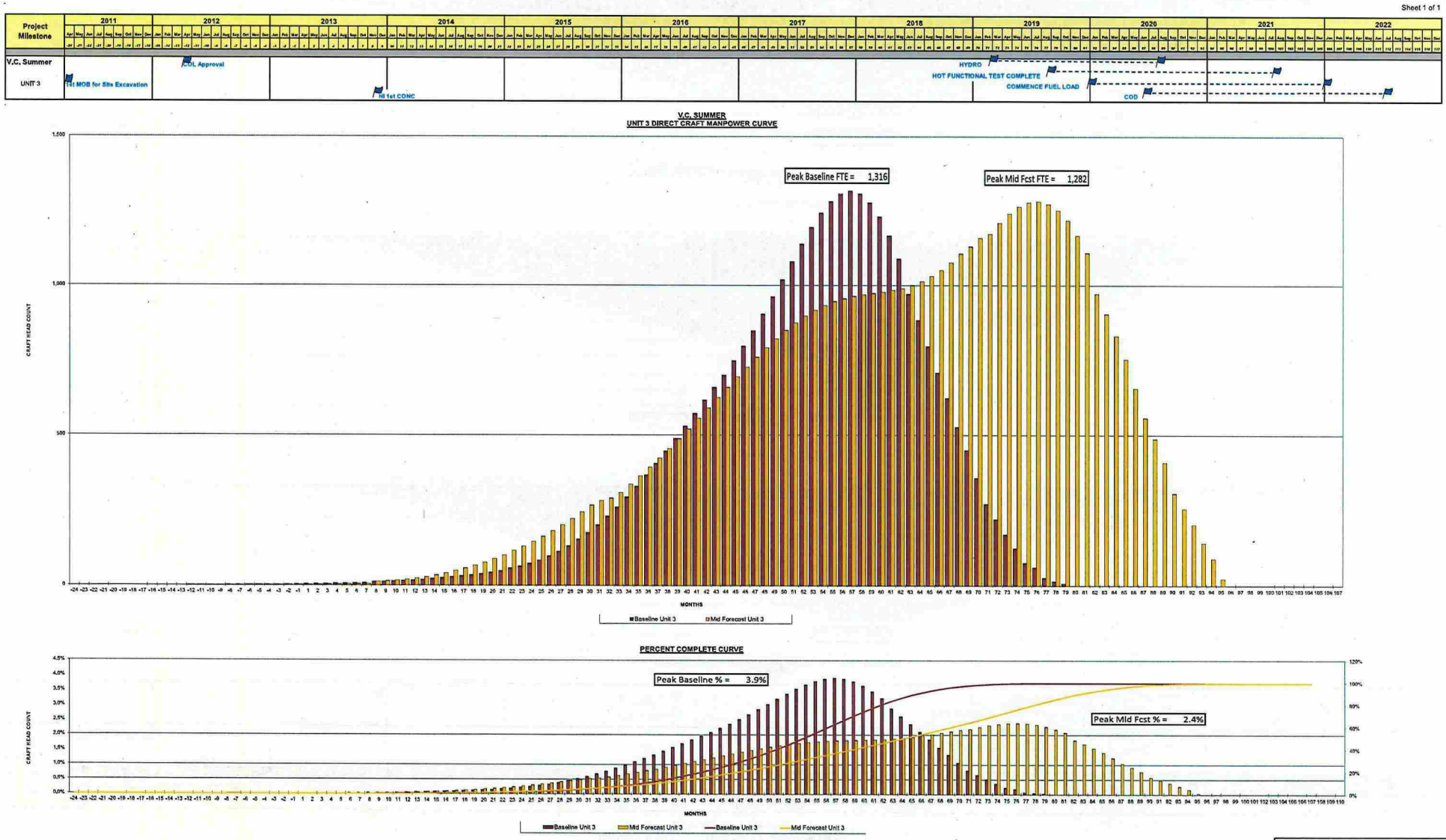

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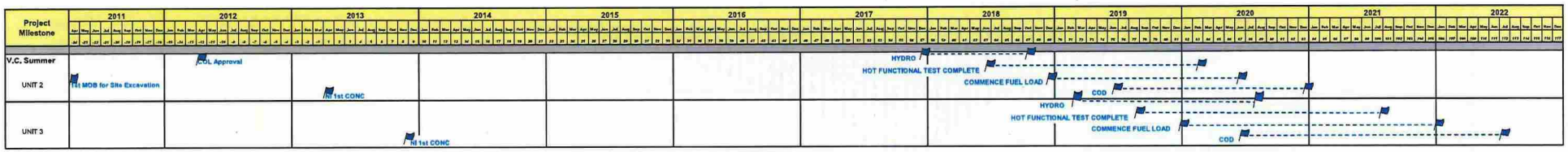
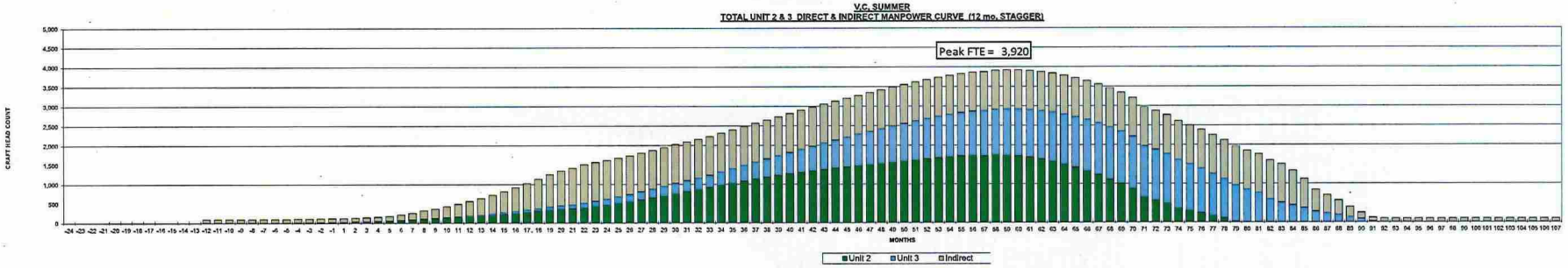
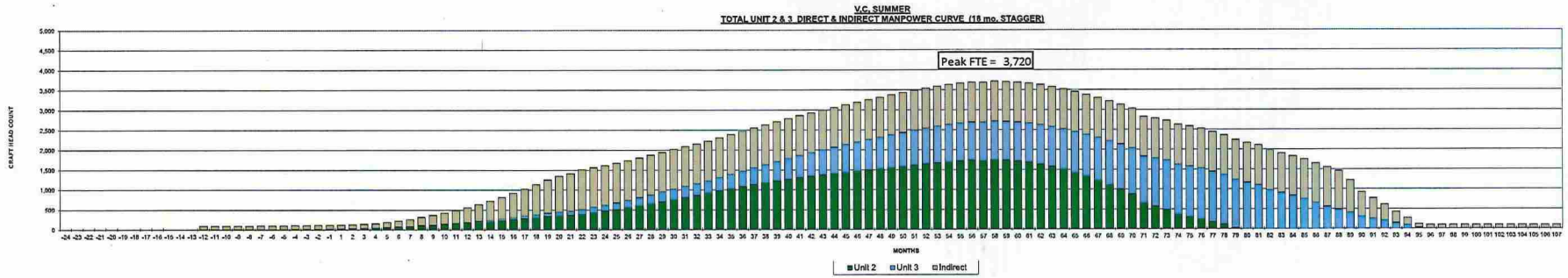
Figure 5-9. Total Unit 2 3 Direct Indirect Manpower Curves
(12, 18, 24 Month Staggers)

Sheet 1 of 1







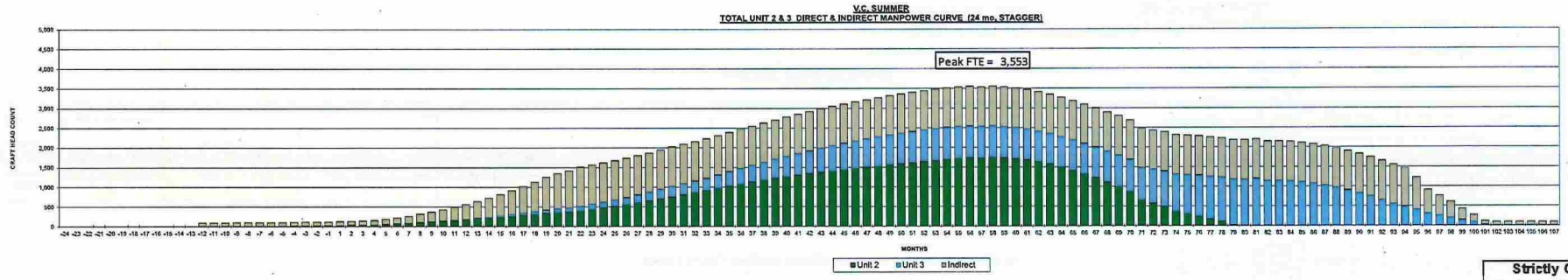


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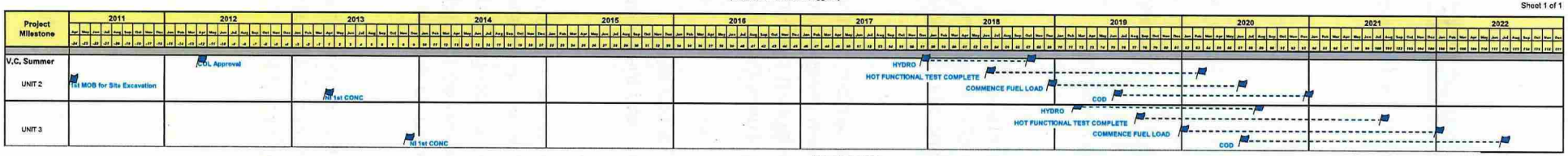
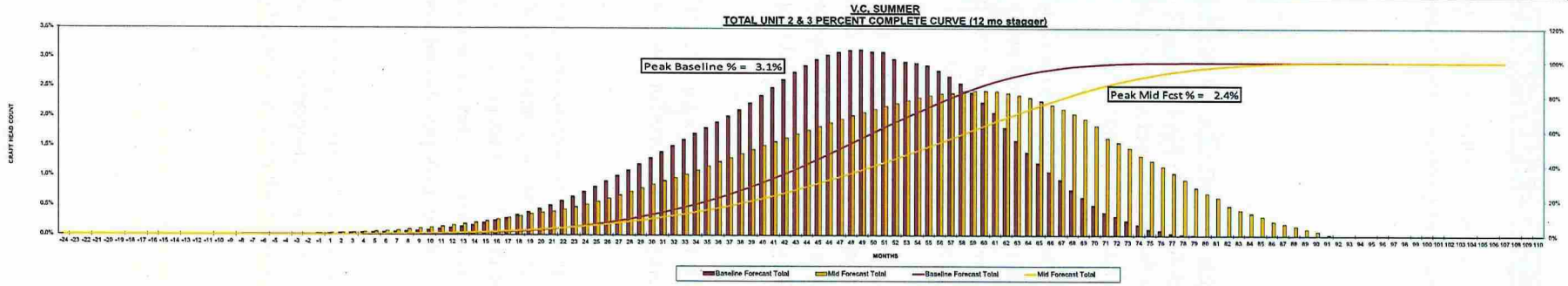
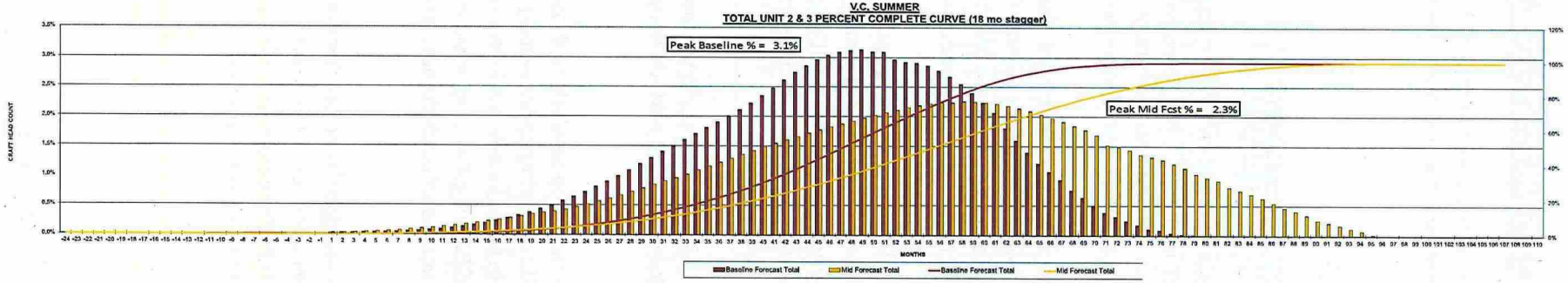
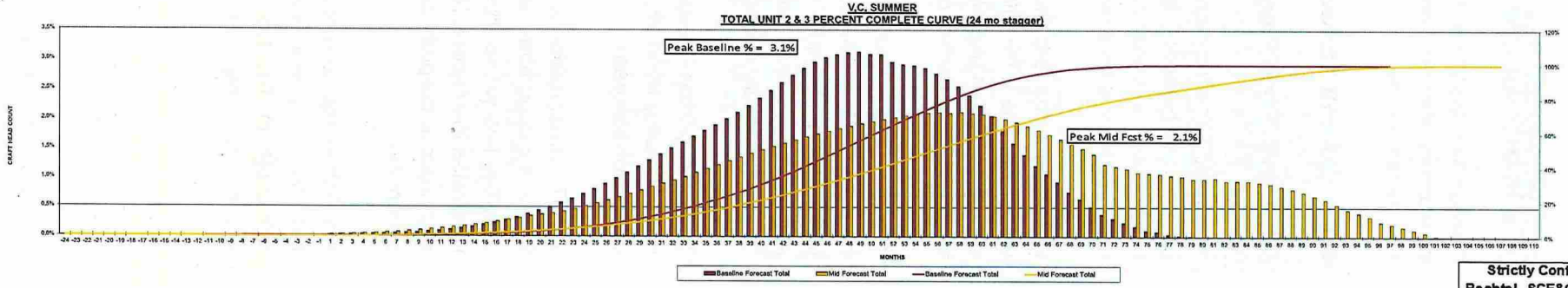
Figure 5-10. Total Unit 2 3 Percent Complete Curves
(12, 18, 24 Month Staggers)









6. Startup

This section describes the assessment of the startup aspects of the project. Section 6.1 provides a summary of the current status. Section 6.2 provides startup observations and recommendations.

6.1 Current Status

6.1.1 Initial Test Program Organization

The Initial Test Program (ITP) is set up for an integrated organizational approach. The Owners have overall responsibility for the ITP; however, leadership has been delegated to the Consortium, and a WEC employee has been named the test director. The balance of the organization will be a mix of Owner and Consortium supplied personnel.

Reporting to the test director is the Component Test Group (CTG), currently led by a CB&I employee. The CTG will take turnover of systems from construction and conduct component testing. CTG test engineers will be discipline based and will specialize in the type of component tests related to his/her discipline (electrical, mechanical, control systems).

The test director leads the Preoperational Test Group (PTG). The PTG will take system turnovers from the CTG, conduct system start-up and tuning, and write and conduct system preoperational tests. Each PTG test engineer will be the point of contact for each of his/her assigned systems and will manage and execute all system-level testing activities. The project plan currently includes 155 to 160 systems and subsystems.

The Startup Test Group (STG) is also currently led by the test director. The STG will take system/facility turnover from the PTG and will support preparations for fuel load and the power ascension program.

The ITP organization is structured similarly to those used in many nuclear power plant facilities. There is a separation between component testing, system testing, and power ascension testing activities that will facilitate high confidence in the results of the test program. It is a program that integrates the Owner, NSSS supplier, and designer/constructor personnel to leverage the right resources to properly progress through component testing, preoperational testing, and power ascension.

In addition, the currently assigned test director has worked for many years in the nuclear power industry, with a significant track record in operation, outage management, and startup of nuclear power plants. This test director appeared well organized and to have a good grasp of the complexity of the project and how to approach it.

6.1.2 Test Program Integrity

a. Transition from Construction to the Initial Test Program

To separate the bulk construction program from the ITP, a formal turnover process will designate the official transfer of care, custody, and control from construction to the CTG. Boundary identification packages (BIPs) have been established to break the facility into smaller and more manageable blocks. There are currently about 555 BIPs that will be the basis for turning the facility equipment over to the CTG.

To provide further separation, performance of work activities will switch from the Consortium's QA program to the Owner's QA program. Subsequent construction access to systems transferred to the CTG will be controlled by a work authorization process controlled by the CTG. The work authorization process will provide for the release of work, ensure system configuration supports the nominated construction activity, and identify any required re-testing of components.

The above is intended to provide a high level of confidence that completed testing activities are not invalidated by unauthorized construction activities and are consistent with the approach used in many nuclear power plant facilities.

b. Preoperational Test Procedure Plan

All system preoperational tests will be treated as if they were safety related (i.e., a single development, review, approval, and performance process regardless of the safety significance of the test). The review plan also provides for a full NRC review cycle and a full Joint Test Working Group (JTWG) review/approval cycle prior to test performance and after performance (test results).

Preoperational test specifications are being developed to identify and collect all requirements to be included in each test procedure. The intent is to assemble the design requirements, system parameters, regulatory requirements, ITAAC commitments, and all acceptance criteria for each system. After each test specification is reviewed and approved, the system preoperational test procedure will be developed.

The above is intended to provide a high level of confidence that the preoperational test program adequately demonstrates the integrity of the systems installed in the plant.

c. Startup and Power Ascension Test Procedure Plan

Power ascension test procedures are similar for the new AP1000 units at V.C. Summer and Vogtle, and the Test Director is coordinating a combined effort to get the basic test procedures developed through a sharing of responsibility to develop the procedures. The total list was divided between the two sites. After each site develops its assigned tests, it should be a simple exercise to "localize" each of the procedures to ensure they become specific to each site.

d. Control Circuit Testing

To verify what has been installed is exactly per the project drawings, the CTG will verify control wiring "point to point" (cold checked) prior to being energized. After cold checking, the circuits will be energized and verified for functional correctness. Initial checks on the control loops may be conducted from remote stations since the current schedule does not suggest the control room will be ready. However, to meet the NRC regulatory guide requirement, those control loops initially verified from remote stations will be re-verified from the control room after it is available. This facilitates an earlier start of control loop functionality to support earlier equipment initial operation, as well as final verification to meet the stipulations in the regulatory guide.

e. Component Test Data Base

All component testing is to be tracked, planned, and statused using an Excel spreadsheet (Component Test Matrix) that is currently loaded from a manual takeoff of P&IDs, and it will be kept current through review of all changes issued by engineering. The spreadsheet includes planned durations of each activity, allows entry of actual durations, and calculates percent complete of each and cumulative activities (activity durations should not be confused with jobhours associated with each activity). Real-time updates of completed data records will be made manually on a daily basis, or as turned in to the admin doing the entry, for a reasonably current representation of progress/status. This is separate from the tracking of ITAAC activity progress.

A completions database is a typical, but critical, element in the control and management of the testing activities. What separates this from the typical completions databases is the ability to apply estimated durations to each activity, and use the results to support schedule development. Manloading and levelization of resources will still be performed in the commercial scheduling software.

6.1.3 Training of Operations and Maintenance Personnel

Training of permanent plant operations and maintenance personnel is the responsibility of the Owner. This was not specifically reviewed; however, it was briefly discussed during interviews with the ITP personnel. The current plan includes significant participation of the operations and maintenance personnel in the entire ITP, from component testing through preoperational testing. This is important to the preparation of the plant staff in their assumption of responsibility for system operation prior to fuel load and is consistent with the approach used in many nuclear power plant facilities.

6.1.4 Test Program Staffing

The current staffing plan has a peak (Unit 2/Unit 3 overlap) of 75 WEC test engineers, about 60 CB&I component test engineers, and about 25 Owner personnel. The staffing seems a little higher than the staffing needed based on previous preoperational and startup testing programs at

nuclear power plant facilities; however, historical dual unit plant startups were typically staggered 12 to 18 months apart, not the 8 to 9 months currently on the project schedule.

The test group will have a dedicated craft labor pool that comes out of construction. The WEC labor budget has been verified against the current staffing plan, while the CB&I budget has not yet been verified but is in progress.

6.1.5 Test Program Schedule

a. Schedule Development/Maturity

The component testing and preoperational testing schedules are developed to the point where prerequisite activities and associated ties are established, and the system-level fragnet templates have been loaded to each startup system. Additionally, standard activity durations have been plugged-in and the group is in the beginning phases of adjusting the durations per the Component Test Matrix and the estimated durations for preoperational tests based on complexity. It is too early to determine if the overall schedule duration will be consistent with the 17 to 18 months currently planned between energization and fuel load, as it may take 3 to 4 months to complete the adjustments and perform resource leveling exercises.

b. Construction Turnover to CTG

Review of the Construction to Component Test Group BIP turnover waterfall schedule indicates turnovers are planned to occur from September 2015 through January 2019; the distribution is as follows:

- 2015: 2 turnovers
- 2016: 44 turnovers (cumulative 46)
- 2017: 475 turnovers, 86% of total (cumulative 521, 94% of the total BIPs)
- 2018: 33 turnovers (cumulative 554)
- 2019: 1 turnover (Cumulative 555)

The current plan calls for 86% (or 475) of the BIPs to be turned over in 2017 alone, which is more than 30 BIPs per month. This is a high rate of turnovers that will be difficult to maintain. Even though the turnover process allows for consolidation of BIPs into fewer, larger turnover packages; this rate still indicates that 86% of the systems will be turned over to the CTG in a 12 month period.

This high number of turnovers produces a cumulative total of 94% at the end of 2017; yet, terminations are shown to be less than 70% complete in most areas. The turnover of completed BIPs does not seem to match the number of terminations completed, as it indicates that the last 6% of the BIPs contain over 30% of the terminations, which does not seem correct.

In addition, stringing the turnover of systems over a 31-month period may present problems. The concept of simultaneous operations, where bulk construction activities will be conducted in close proximity to components (and potentially systems) that will be energized and in testing introduces the concepts of Permit to Work (Energized Equipment Lockout/Tagout) and NFPA 70E , Standard for Electrical Safety in the Workplace (arc flash protection). This extends the period of time that poses safety risk to personnel and has a higher potential to slow installation of construction bulks and slip schedule. This can all be managed; but, a total turnover duration (first turnover to last turnover) of 18 to 20 months is more typical of nuclear power plant facilities.

The current project schedule indicates an approximate 9 month stagger between Unit 2 and Unit 3 hot functional tests. This is more aggressive than what was experienced on many past nuclear power plant facilities, which could preclude leveraging personnel from Unit 2 on Unit 3, as well as introducing the concept of two new units on the same site overlapping initial fuel load activities and initial power ascension.

6.2 Observations and Recommendations

Startup observations and recommendations are identified in Table 6-1.

Table 6-1. Startup Observations and Recommendations

No.	Description
S1	Observation(s) The current ITP staffing plan includes heavy Tech Staff, Operations, and Maintenance staff participation. Recommendation(s) • Be diligent with dedication of these resources to support the ITP. The hands-on experience acquired through participation in the test program is important to good performance during the early days of plant initial operation.
S2	Observation(s) The current schedule identifies about 8 months lag between the Unit 2 and Unit 3 hot functional tests. This lag is significantly shorter than previous dual unit nuclear sites, and drives the testing group staffing levels fairly high. Recommendation(s) • Evaluate the likelihood of realizing an 8 month lag between Units 2 & 3. If realistic, ensure mitigations have been planned in case of events on one of the units while the other is in the vulnerable position of still in the testing phase. If not realistic, consider historical lags closer to 12 to 18 months.
S3	Observation(s) The construction turnover of BIPs to the CTG is planned to occur over a 31-month period. This is a long time to have equipment in various stages of testing and layup. Recommendation(s) • Consider reducing the duration of the turnover period to 18 months. This may permit realloca-

Table 6-1. Startup Observations and Recommendations	
No.	**Description**
	tion of resources to complete systems in a more reasonable schedule, reduce the duration the facility would be in a simultaneous operations mode, and possibly reduce the cost of actually completing BIPs.
S4	Observation(s) The timing of construction completion of bulks does not align with the timing of BIP turnovers. At the end of 2017, construction plans to be less than 70% complete with terminations, yet, plans to have turned over 94% of the BIPs. Recommendation(s) • Reexamine construction terminations per cent complete compared to BIP turnovers and adjust the project schedule accordingly.
S5	Observation(s) The overall ITP organization and program are well thought out and follow proven philosophies and processes. Recommendation(s) • Continue along this execution plan and make modifications only if project or regulator changes warrant them.

7. Conclusions

The AP1000 is a first-of-a-kind technology, 10 CFR 52 is a new licensing process, and these are the first new nuclear plants being constructed in the U.S. in decades. Challenges would be expected.

However, the V.C. Summer Units 2 & 3 project suffers from various fundamental EPC and major project management issues that must be resolved for project success:

- The Consortium's project management approach does not provide appropriate visibility and accuracy to the Owners on project progress and performance.
- The Consortium's forecasts for schedule durations, productivity, forecasted manpower peaks, and percent complete do not have a firm basis. Bechtel's assessment, based on certain assumptions, of the Unit 2 and 3 commercial operation dates indicates:

Impacts on Commercial Operation Dates		
	Unit 2	Unit 3
Current COD	June 2019	June 2020
Adjustment	18 to 26 months	24 to 36 months
New COD	Dec 2020 to Aug 2021	June 2022 to June 2023

- There is a lack of a shared vision, goals, and accountability between the Owners and the Consortium.
- The Consortium lacks the project management integration needed for a successful project outcome.
- The WEC-CB&I relationship is strained, caused to a large extent by commercial issues.
- The overall morale on the project is low.
- The Contract does not appear to be serving the Owners or the Consortium particularly well.
- The issued design is often not constructible resulting in a significant number of changes. The construction planning and constructability review efforts are not far enough out in front of the construction effort to minimize impacts.
- There is significant engineering and licensing workload remaining (currently over 800 engineers). ITAAC closure will be a significant effort.
- Emergent issues potentially requiring NRC approval of LARs remain a significant project concern.
- There is a significant disconnect between construction need dates and procurement delivery dates.

- The amount of stored material onsite is significant, creating the need for an extended storage and maintenance program.
- Construction productivity is poor for various reasons including changes needed to the design, sustained overtime, complicated work packages, aging workforce, etc.
- The indirect to direct craft ratio is high.
- Field non-manual turnover is high.
- The Owners do not have an appropriate project controls team to assess/validate Consortium reported progress and performance.
- The schedule for the startup test program is in the early stages of development. The BIP turnover rate appears to be overly aggressive.

Bechtel recognizes that the recently announced purchase of CB&I nuclear by WEC may change some of the recommendations regarding the Consortium. Nonetheless, most of the recommendations identified in this report still apply to the project under the new EPC contract structure.

Appendix A

Documents Received from the Owners and the Consortium

Appendix A
Documents Reviewed from the Owners and the Consortium

Documents reviewed during the assessment are identified in Table A-1.

Table A-1. Documents Reviewed During the Assessment

No.	Description	Hard Copy (HC) or Electronic (E)
1.1	VCS Project Supply Chain Management-Procurement Plan, VSG-GW-GPH-010), 5/8/15, 87 pages	E
1.1.1	VCS Project Construction Execution Plan (VSG-GW-GCH-001), Rev 2, 11/19/09, 64 pages	E
1.1.2	VCS Project Resource Staffing Plan, VSG-GW-GXH-001), 2/6/09, 11 pages	E
1.1.3	VCS Project Regulatory-Licensing Management Plan, (VSG-GW-G:H-001), Rev 5, 6/5/09, 14 pages	E
1.1.4	VCS Project Execution Plan (VSG-GW-GBH-300), Rev 3, 8/13/09, 52 pages	E
1.1.5	VCS Project Engineering Plan (VSG-GW-GEH-001), Rev 2, 1/18/12, 50 pages	E
1.1.6	VCS Project Completion and Closeout Plan (VSG-GW-GBH-370), Rev 1, 3/4/09, 19 pages	E
1.1.7	VCS Integrated Project Risk Management Plan (VSG-GW-GBH-310), Rev 1, 9/5/13, 10 pages	E
1.1.8	VCS ITAAC Program Execution Plan (VSG-GW-GLH-002), Rev 3, 1/12/15, 37 pages	E
1.1..9	NNDG-CS-0001 Rev. 5 - Oversight of Construction Activities (NNDG-CS-0001), Rev 5, 1/22/15, 8 pages	E
1.1.10	Project Oversight Strategy Plan, Rev. 2, 11/12/14,28 pages	E
1.1.11	NNDG-AP-0003 - Oversight Plan Development and Execution (NNDG-AP-0003), 6/11/14, 10 pages	E
1.1.12	NND-CS-0013 - Risk Assessment of Consortium Construction Activi-ties, 1/22/15, 9 pages	E
1.1.13	NND-QS-0006 Rev. 2 - NND QS Audits, Rev 2, 12/17/15, 40 pages	E
1.1.14	NND-CS-0013 Attachment 1 From Review 06-18-2015, 6/18/15,7 pages	E
1.1.15	NND-AP-0308 Rev. 0 - Construction Readiness Review Procedure, 5/29/14, 9 pages	E
1.1.16	NND-AP-0304 Rev. 1 - Construction Oversight, Rev 1, 4/30/13, 11 pages	E
1.1.17	NND-AP-0024 Rev. 3 - Assessment Program, Rev 3, 10/9/14, 83 pages	E
1.1.18	NND-AP-0018 Rev. 5 - Observation Program , Rev 5, 2/3/15,33 pages	E
1.1.19	AP1000 Initial Test Program - Commissioning Program and Turnover	E

Table A-1. Documents Reviewed During the Assessment		
No.	Description	Hard Copy (HC) or Electronic (E)
	Plan (VSG-GW-GBH-360), Rev 2) , 1/12/15,129 pages	
1.1.20	NND-AP-0002 Rev. 15 - Corrective Action Program (NND-AP-0002), Rev 15), 3/31/15,63 pages	E
1.2	V.C. Summer Units 2 & 3 Monthly Status Report - MARCH 2015, 107 pages	E
1.2.1	V.C. Summer Units 2 & 3 Monthly Status Report - JUNE 2015, 111 pages	E
1.2.2	V.C. Summer Units 2 & 3 Monthly Status Report - APRIL 2015, 116 pages	E
1.2.3	V. C. Summer Units 2 & 3 Monthly Status Report - MAY 2015, 112 pages	E
1.2.4	2015 07 16 - July PRM (final), 7/16/15,170 pages	E
1.2.5	2015 06 17 - June PRM Slides (Final), 6/18/15,181 pages	E
1.2.6	2015 05 21 - May PRM (final), 168 pages	E
1.2.7	2015 04 17 - April PRM (final as presented), 154 pages	E
1.2.8	2015 03 17 - March PRM (final), 154 pages	E
1.3	June 2015 Consortium Monthly Meeting Minutes, 6-18-15, 103 pages	E
1.3.1	May 2015 Consortium Project Review Meeting Minutes, 6-17-15, 97 pages	E
1.3.2	May 2015 Project Review Meeting Minutes - Owner Comments, 5-21-15, 7 pages	E
1.3.3	March 2015 Project Review Meeting Minutes - Owner Comments, 3/19/15, 8 pages	E
1.3.4	March 2015 Consortium Project Review Meeting Minutes, 4/8/15, 88 pages	E
1.3.5	June 2015 Project Review Meeting Minutes - Owner Comments, 6/18/15, 9 pages	E
1.3.6	June 2015 Consortium Project Review Meeting Minutes, 7/14/15, 103 pages	E
1.3.7	April 2015 Project Review Meeting Minutes - Owner Comments, 4/16/15, 8 pages	E
1.3.8	April 2015 Consortium Project Review Meeting Minutes, 90 pages	E
1.5	VC Summer Site Overall Craft Staffing (Includes Absenteeism and PF) dated 5/5/2015, 1 pages, 11 X 17	HC
1.5.1	VC Summer Site Overall Craft Forecast and Actuals, dated 8/27/15, 1 pages, 11 X 17	HC
1.5.2	Power Leadership_CBI_as of Jan 2015, 1 page	E
1.5.3	NND Staffing_8-15 (Owner Staffing), 2 pages	E
1.6	Westinghouse Engineering org charts for VCS Assessment, 6-1-15, 7 pages	E
1.6.1	NP&MP Org Charts for VCS Assessment – 6-1-15, 8 pages	E

Table A-1. Documents Reviewed During the Assessment		
No.	**Description**	**Hard Copy (HC) or Electronic (E)**
1.6.2	Westinghouse Nuclear Automation org charts for VCS Assessment - July 28, 2015, 8 pages	E
1.6.3	VC Summer Site Org Chart - CB&I - Jan 2015, 1/29/15,16 pages	E
1.6.4	Westinghouse Nuclear Automation org charts for VCS Assessment - July 28, 2015, 8 pages	E
1.6.5	Westinghouse Engineering org charts for VCS Assessment - July 28, 2015, 7 pages	E
1.6.6	WEC VCS Org Chart - Site 07-28-15, 1 page	E
1.6.7	Power_Leadership_CBI_2015.7.15, 1 page	E
1.6.8	NP&MP Org Charts for VCS Assessment, 6/1/15,22 pages	E
1.6.9	NP&MP Org Charts for VCS Assessment - July 28, 2015, 22 pages	E
1.7	Calendar of Weekly/Monthly Meetings (w/Owner attends highlighted), 3 pages, 8.5 X 11	HC
1.8	Top 17 Risks – Mitigation Plans (As of August 3, 2015; VC Summer Schedule Risk Register, dated 8/5/15, 14 pages, , 8.5 X 11	HC
1.8.1	VCS Items Meeting, dated 9/4/15,9 pages, , 8.5 X 11	HC
1.8.2	VC Summer Plan of the Day – 9/3/15, 36 pages, PowerPoint , 8.5 X 11	HC
2.1	Design Completion (Luca Oriani, Westinghouse), 5 pages, 8.5 X 11	HC
2.3.1	WEC PCC Level 1 Critical Issues List, 3 pages, 11 X 17	HC
2.3.2	Issues List, dated 9/4/15, 5 pages, 8.5 X 11	HC
2.8.	Pending DCP List, 9/3/15, 4 pages, 8.5 X 11	HC
2.8.1	VC Summer LAR Cross Reference, 9/10/15, 18 pages, PowerPoint 8.5 X 11	HC
2.8.2	Overview of the AP1000 Design Change Process, dated 1/14/15, 18 pages, PowerPoint , 8.5 X 11	HC
2.9	AP1000 Plant Major Milestones, 28 pages, PowerPoint 8.5 X 11	HC
2.9.1	P&ID Revisions (P2P, 8/31/15), 10 pages, 11 X 17	HC
3.2	Weekly Modules 4-Box Report - 07-14-15 Rev. 1, 37 pages	E
4.1	VCS 2 & 3 Weekly Construction Metric 15-07-27, 58 pages	E
4.2.1	Unit 3 Total CB&I Commodity Percents Complete (graph), dated 9/3/15, 3 pages, 11 X 17	HC
4.2.2	VC Summer Site Total CB&I Percents Complete (graph)	HC
4.2.3	Unit 2 CB&I Commodity Percents Complete	HC
4.3	VCS Project Subcontracting Strategy – Report, dated 8/31/15, 17 pages, 11 X 17	HC
4.4	VC Summer Daily Report 7 21 2015, 7/21/15,6 pages	E
4.5	VC Summer Equipment List, 25 pages, 8.5 X 11	HC
5.1	2015-08-03 Month End U3 Integrated Calc Major Milestone-Key Dates, 8/6/15, 1 page	E
5.1.1	2015-08-03 Month End U2 Integrated Calc Major Milestone-Key	E

Table A-1. Documents Reviewed During the Assessment		
No.	Description	Hard Copy (HC) or Electronic (E)
	Dates, 8/6/15, 1 page	
5.1.2	2015-06-29 Month End U3 Integrated Calc Major Milestone-Key Dates, 7/7/15, 1 page	E
5.1.3	2015-06-29 Month End U2 Integrated Calc Major Milestone-Key Dates, 7/7/15, 1 page	E
5.1.4	2015-06-01 Month End U3 Integrated Calc Major Milestone-Key Dates, 6/5/15, 1 page	E
5.1.5	2015-06-01 Month End U2 Integrated Calc Major Milestone - Key Dates, 6/5/15, 1 page	E
5.1.6	2015-04-27 Month End U2 Integrated Calc Major Milestone-Key Dates, 4/28/15,1 page	E
5.1.7	2015-04-27 Month End U3 Integrated Calc Major Milestone-Key Dates, 4/28/15, 1 page	E
5.1.8	2015-03-30 Month End U3 Integrated Calc Major Milestone-Key Dates, 4/9/15, 1 page	E
5.1.9	2015-03-30 Month End U2 Integrated Calc Major Milestone-Key Dates, 4/9/15,1 page	E
5.2	2015-08-03 U3 Crit Path ILRT, 8/5/15, 4 pages	E
5.2.1	2015-08-03 U3 Crit Path COD, 8/5/15, 4 pages	E
5.2.2	2015-08-03 U2 Crit Path ILRT, 8/5/15, 4 pages	E
5.2.3	2015-08-03 U2 Crit Path COD, 8/5/15, 5 pages	E
5.2.4	2015-06-29 U3 Crit Path ILRT, 6/30/15, 4 pages	E
5.2.5	2015-06-29 U3 Crit Path COD, 7/7/15,4 pages	E
5.2.6	2015-06-29 U2 Crit Path ILRT, 6/29/15,3 pages	E
5.2.7	2015-06-29 U2 Crit Path COD, 7/7/15,4 pages	E
5.2.8	2015-06-01 U3 Crit Path COD, 6/3/15,4 pages	E
5.2.9	2015-06-01 U3 Crit Path ILRT, 6/4/15, 4 pages	E
5.2.10	2015-06-01 U2 Crit Path ILRT, 6/3/15,3 pages	E
5.2.11	2015-06-01 U2 Crit Path COD, 6/2/15,6 pages	E
5.2.12	2015-04-27 U3 Crit Path ILRT, 4/30/15,4 pages	E
5.2.13	2015-04-27 U3 Crit Path COD, 4/30/15,5 pages	E
5.2.14	2015-04-27 U2 Crit Path ILRT, 4/30/15,5 pages	E
5.2.15	2015-04-27 U2 Crit Path COD, 4/30/15,4 pages	E
5.2.16	2015-03-30 U3 Crit Path ILRT, 4/6/15,4 pages	E
5.2.17	2015-03-30 U3 Crit Path COD, 4/6/15, 4 pages	E
5.2.18	2015-03-30 U2 Crit Path ILRT, 4/1/15, 4 pages	E
5.2.19	2015-03-30 U2 Crit Path COD, 4 pages	E
6.1	QA Audits at VC Summer 2014/2015, 1 page, 8.5 X 11	HC
6.1.1	Quality Assurance Scheduled Surveillances, dated 8/26/15, 18 pages, 8.5 X 11	HC

Table A-1. Documents Reviewed During the Assessment		
No.	Description	Hard Copy (HC) or Electronic (E)
6.5	NND-AUD-201503 Owner's COL and Project Oversight Audit, 7/2/15,16 pages	E
6.5.1	NND-15-0247 2015 Corrective Action Program Audit Report, 4/16/15,9 pages	E
6.5.2	NND-15-0143 Parallel Module Fabrication Process Audit Report, 3/24/15,8 pages	E
6.5.3	NND-15-0090 2015 Procurement Processes Audit Report, NND-AUD-201501, 2/20/15,8 pages	E
6.5.4	2015 Audit Schedule Rev. 1, 6/12/15,2 pages	E
7.1	Licensing Weekly 8-3-15, 10 pages	E
7.1.1	Licensing Weekly 8-10-15, 10 pages	E
7.1.2	Licensing Weekly 7-6-15, 11 pages	E
7.1.3	Licensing Weekly 7-27-15, 10 pages	E
7.1.4	Licensing Weekly 7-20-15, 10 pages	E
7.1.5	Licensing Weekly 7-13-15, 10 pages	E
7.1.6	Licensing Weekly 6-8-15, 11 pages	E
7.1.7	Licensing Weekly 6-29-15, 12 pages	E
7.1.8	Licensing Weekly 6-15-15, 11 pages	E
7.1.9	Licensing Weekly 6-22-15, 11 pages	E
7.1.10	Licensing Weekly 6-1-15, 11 pages	E
7.2.11	2015-08-10 VC Summer NRC Schedule, 3 pages	E
7.2.12	2015-08-03 VC Summer NRC Schedule, 3 pages	E
7.2.13	2015-07-27 VC Summer NRC Schedule, 3 pages	E
7.2.14	2015-07-20 VC Summer NRC Schedule, 3 pages	E
7.2.15	2015-07-13 VC Summer NRC Schedule, 3 pages	E
7.2.16	2015-07-06 VC Summer NRC Schedule, 3 pages	E
7.2.17	2015-06-29 VC Summer NRC Schedule, 3 pages	E
7.2.18	2015-06-22 VC Summer NRC Schedule, 3 pages	E
7.2.19	2015-06-15 VC Summer NRC Schedule, 3 pages	E
7.2.20	2015-06-08 VC Summer NRC Schedule, 3 pages	E
7.2.21	2015-06-01 VC Summer NRC Schedule, 3 pages	E
7.4	VCS Permit Status 6-11-15, 5 pages	E
7.8	NRC Report 8-4-15, 8/4/15,3 pages	E
7.8.1	NRC Report 7-7-15, 7/7/15,3 pages	E
7.8.2	NRC Report 7-21-15, 7/21/15,3 pages	E
7.8.3	NRC Report 7-14-15, 7/14/15,3 pages	E
7.8.4	NRC Report 6-9-15, 6/9/15,3 pages	E
7.8.5	NRC Report 6-2-15, 6/2/15,3 pages	E

Table A-1. Documents Reviewed During the Assessment		
No.	Description	Hard Copy (HC) or Electronic (E)
7.8.6	NRC Report 6-16-15,6/16/15,3 pages	E
7.8.7	NRC Report 5-5-15, 5/5/15,3 pages	E
7.8.8	NRC Report 5-19-15, 5/19/15,3 pages	E
7.8.9	NRC Report 5-13-15, 5/13/15,3 pages	E
8.1	Engineering, Procurement and Construction Agreement between SCE&G, for Itself and as Agent for the SC Public Service Authority, as owner and a Consortium consisting of Westinghouse Electric Company LLC and Stone & Webster, Inc., as Contractor for AP1000 Nuclear Power Plants Dated as of May 23, 2000 (Confidential Trade Secret Information – Subject to Restricted) dated 5/23/08 (176 pages, 8.5 X 11)	HC
9.1.1	Owner Org Charts - Bechtel Assessment, 1 page	E
9.1.1.2	Owner Org Charts - Bechtel Assessment, 14 pages	E
9.3	Exhibit A, Scope of Work/Supply and Division Responsibility, 62 pages, 8.5 X 11	HC
9.3.1	AP1000 Plant Division of Responsibility – VC Summer 2&3 (VSG-GW-G8Y-100), 70 pages, 8.5 X 11	HC
10.1	Commercial Review Meeting, dated 8/19/15, 7 pages, PowerPoint 8.5 X 11	HC
10.2	Unit 3 Standard Plant Performance (Month end July 2015), 1 page, 11 X 17	HC
10.12	VC Summer U0 CSI Site-Specific EPC, dated 9/7/15, 3 pages, 11 X 17	HC
11.2	Modules Illustration, 1 page, 8.5 X 11	HC
11.2.1	AP1000 Module Overview NI Structural Modules, 166 pages, PowerPoint 8.5 X 11	HC
11.27	Project Controls Meeting Material (9/15 Meeting), 15 pages, 11X17	HC
12.1	VC Summer Plan of the Day, October 01, 2015, 33 pages, PowerPoint 8.5 X 11	HC
12.2	Nuclear Island Mechanical Systems Reference Document Package,AP1000, May 2015 (Includes General Arrangements, Room Numbering and Module Locations, 79 pages, 11X17	HC
12.3.1	Un-redacted Article 3 added (9/25/15) Un-redacted Article 7 added (9/25/15), but related Exhibit J, not added. Un-redacted Article 9 and 10 added (9/25/15) - Schedule E, project schedule – not added - Schedule F, milestone schedule – not added - Schedule J, price adjustment provisions – not added	HC
12.3.2	Agreement Change Order 1 – 7/14/08, Engineering, Procurement and Construction Agreement, 8 pages, 8.5 X 11	HC
12.3.3	Agreement Change Order 2 – 9/10/09 (provision of Limited Scope Simulators, LSS) 12 pages, 8.5 X 11	HC

Table A-1. Documents Reviewed During the Assessment		
No.	**Description**	**Hard Copy (HC) or Electronic (E)**
12.3.4	Agreement Change Order 3 – 1/14/10, Parr Road Rehabilitation, 27 pages, 8.5 X 11	HC
12.3.5	Agreement Change Order 5 – 5/4/10, Revised Senior Reactor Operator Instructor Training Program, 37 pages, 8.5 X 11	HC
12.3.6	Agreement Change Order 6 – 6/29/10, (substitute HydraNuts ILO AP1000 Standard Plant reactor vessel stud tensioners . . .), 14 pages, 8.5 X 11	HC
12.3.7	Agreement Change Order 7 – 7/1/10, (Stone & Webster . . . .), 9 pages, 8.5 X 11	HC
12.3.8	Agreement Change Order 8 – 4/11/11, (transfer Stone & Webster Target Price COW to Firm Price . . .), 51 pages, 8.5 X 11	HC
12.3.9	Agreement Change Order 9 – 11/23/10, (RFP to reconfigure outgoing transmission lines from VCS#2 switchyard . . .), 5 pages, 8.5 X 11	HC
12.3.10	Agreement Change Order 10 – 11/22/10, Access to Westinghouse Primavera Architecture, 12 pages, 8.5 X 11	HC
12.3.11	Agreement Change Order 11 – 2/14/11, Study and Analyze the Impact of Delayed COL. Receipt of Construction Schedule, 8 pages, 8.5 X 11	HC
12.3.12	Agreement Change Order 12 – 12/8/11, Impa ct from Health Care and Education Reconciliation Act of 2010, 12 pages, 8.5 X 11	HC
12.3.13	Agreement Change Order 13 – 2/14/12, Ovation Work Stations. 4 pages, 8.5 X 11	HC
12.3.14	Agreement Change Order 14 – 2/26/12, Cyber Security Phase 1, 53 pages, 8.5 X 11	HC
12.3.15	Agreement Change Order 15 – 2/16/12,WLS Discharge Piping, 4 pages, 8.5 X 11	HC
12.3.16	Agreement Change Order 18 – 9/17/14, Perch Guards, 6 pages, 8.5 X 11	HC
12.3.17	Agreement Change Order 19 – 10/1/14, Simulator Hardware/Software/Training, 11 pages, 8.5 X 11	HC
12.3.18	Agreement Change Order 20 – 12/2/14, Method of Calculating ACA Impact 2011, 2012, 2013, 8 pages 8.5 X 11	HC
12.3.19	Agreement Change Order 21 – 2/16/15, ITAAC Maintenance, 8 pages, 8.5 X 11	HC
12.3.20	Agreement Change Order 22 – 7/30/15, Common-Q Maintenance Training System Equipment and Software, 31 pages, 8.5 X 11	HC
12.3.21	Agreement Change Order 23 – 8/5/15, Simulator Development System (SDS), 64 pages, 8.5 X 11	HC
12.3.22	Agreement Change Order 24 – 8/20/15, 94 pages, 8.5 X 11	HC
12.5	Field Fabrication and Installation Specification, 3.9 Installation of Spool Pieces and Field Fabricated Piping/Training, 6 pages, 8.5 X 11	HC
12.5.1	Piping Isometric General Notes, Dwg. No. APP-GW-P_W-100, 1 page, 11 X 17	HC

Table A-1. Documents Reviewed During the Assessment		
No.	**Description**	**Hard Copy (HC) or Electronic (E)**
12.5.2	Piping Isometric Symbol Legend, Dwg No. APP-GW-PLW-102, 1 page, 11 X 17	HC
12.5.3	Shield Building Stell Wall Panels EL 100-0" to 248'-6 1/2 " General Notes, Sheet 1 & 2, 11 X 17	HC
12.5.4	AP1000 Structural Modules General Notes Dwg No. APP-GW-S9-100 through 107, 7 pages, size 11X17	HC
12.5.5	General Notes Mechanical Modules (Dwg No. APP-GW-K9-100 through 103, 4 pages, size 11X17	HC
12.9	Westinghouse Home Office Engineers not charging/charging VC Summer Project, 1 page, size 8.5 X 11	HC
12.9.1	CB&I Total Head Count for Design Engineering and Support, 1 page, size 8.5 X 11	HC
12.10	Historical and Open E&CDRs and N&Ds,4 pages, size 8.5 X 11	HC
12.13	Cives CGD Submittal Review Status, 1 page, 8.5 X 11	HC
12.15	Site Overall Total, Direct Construction Only (Planned and Earned Hours) curve, 1 page, 11X17	HC
12.17	VC Summer Total Steel Commodity, 7 pages, 11X17	HC
12.21	CB&I Direct Construction Labor Summary, dated May, 2015, 1 page, 11X17	HC
12.23	Available Work Assuming No Manpower Constraints (table), 1 page, 8.5 X 11	HC
12.24	VC Summer Initial Test Program Unit 2 & 3, Target Completion Schedule, 1 page, 11X17	HC
12.26	EBS_NND_ Daily Active Detail, 7 pages, 8.5 X 11	HC
12.28	ROS Impacts Report, 6 pages, 11X17	HC
12.29	Engineering Impacts Report, 1 pages, 8.5 X 11	HC
13.1	Westinghouse Engineering Remaining Schedule (2015-09-28), 135 pages, 8.5 X 11	HC
13.7	WEC PO Status report, 1 page, 8.5 X 11	HC
13.9	Corrective Action Program Status (CAPS) Report, dated 9/17/15, 19 pages, 8.5 X 11	HC
14.2	Indirect Cost Review, 22 pages, 8.5 X11	HC
14.3	Indirect/direct hours Week Ending 08-16-15 (Indirect Labor Report), 4 pages, 8.5 X 11	HC
15.6	Summary of the key engineering activities in the ECS remaining in the schedule that have a tie to construction, 1 page, 8.5 X 11	HC
15.6.1	Post-Engineering Design Closure Work Streams, 1 page, 8.5 X 11	HC
15.6.2	Engineering Items – ROYG (2015 – 09-28), pages 1 – 70, 11X17	HC
15.6.3	Procurement Items – ROYG (2015-09-28) pages 1-128, 11X17	HC
15.6.4	Licensing Items - ROYG (2015-09-28) pages 1-12, 11X17	HC
15.7	Engineering Resources, 1 page, 8.5 X 11	HC

Table A-1. Documents Reviewed During the Assessment		
No.	**Description**	**Hard Copy (HC) or Electronic (E)**
15.9	VC Summer Discussion on I&C Schedule & PRS – July 2015, 10 pages	HC
15.9.1	I&C Baseline 8 Engineering Remaining, 51 pages, 8.5 X 11	HC
15.11	Annex Building Cable Tray Plan Area EL 100' – 0", Sheet 2 of 2, Dwg No. APP4031-ER-013, 1 page, 11X17	HC
15.11.1	Annex Building Cable Tray Support Location Plan Area 1 & Area 4 EL 100' – 0" Sheet 2 0f 3, Dwg No. APP4031-SH-014, 1 page, 11X17	HC
15.11.2	Annex Building Cable Tray Support List & Fabrication Details Area 1, EL 100'-0" Sh 1 of 3 Dwg No. APP-4031-SHX-01201, 1 page, 11X17	HC
15.11.3	Annex Building Cable Tray Support List & Fabrication Details Area 1, EL 100'-0" Sh 2 of 3, Dwg No. APP-4031-SHX-01301 1 page, 11X17	HC
15.11.4	Annex Building Cable Tray Support List & Fabrication Details Area 1, EL 100'-0" Sh 3 of 3, Dwg No. APP-4031-SHX-01401 1 page, 11X17	HC
15.11.5	Fabrication Requirements Cope Tray Supports Seismic Category III Trapeze Rod Support Detail, Dwg No. APP-SH27-VF-201, 1 page, 11X17	HC
15.11.6	Annex Building – Area 4 Structural Steel Roof Supplemental Steel Plan, Dwg No. AP-4044-SS-005, 1 page, 11X17	HC
15.13	Remaining Hold DDs, 37 pages, 1 page 8.5 X 11, 36 pages 11 X 17	HC
15.13 – 15.14	Hold Docs missing DD, 3 pages, 11 X 17	HC
15.16	CB&I Remaining Equipment Deliveries, 100 pages, 11X17	HC
15.16.1	Westinghouse Remaining Equipment Deliveries, 17 pages, 11X17	HC
16.1 – 16.6	List – Construction Package – On Hold, 3 pages, 11X17	HC
16.1 – 16.6.1	VC Summer Unit -2 Auxiliary Building Room Plan 12306, Strategic Planning Team September 14, 2015 (DRAFT), dated 9/14/15, 13 pages, 8.5 X 11	HC
16.1 – 16.6.2	Email (fr James B. Kelly to Con Matthews dated 9/24/15, Subject: Drawings required for Electrical cable tray supports with APP-GW-GBH-451, Rev 0, AP1000 Standard Plant Engineering Document List – Annex Building Areas 1, 2, 3 – Raceways and Supports Construction Deliverables – Elevation 100' to 117'6" (AN2-RC-X) 15 pages, 8.5 X 11	HC
16.1 – 16.6.3	Annex Building Cable Tray Plan Area 1 El. 100' -0" Sheets 1 o f3, Dwg No. APP-4031-ER-012, 1 page 11X17	HC
16.1 – 16.6.4	Liquid Radwaste System, Auxiliary Building Room 12259, Annulus Pipe Chase, Dwg No. APP-WLS-PLW-451, 1 page, 11X17	HC
16.1 – 16.6	Pipe Support Drawing WLS System, Dwg No. APP-WLS-PH-12R00891, 1 page, 11X17	HC
16.1 – 16.6.5	Shield Building Lower Annulus Inside Embedments Development View Radius 69'-6" (Sheet 1), Dwg No. APP-1020-CE-100, 1 page, 11X17	HC
16.1 –	Shield Building Lower Annulus Inside Embedments Index Develop-	HC

Table A-1. Documents Reviewed During the Assessment		
No.	**Description**	**Hard Copy (HC) or Electronic (E)**
16.6.6	ment View Radius 69'-6" (Sheet 1), Dwg No APP-1020-CEX-100, 1 page, 11X17	
16.1 – 16.6.7	Shield Building Lower Annulus Inside Embedments Index Development View Radius 69'-6" (Sheet 2), Dwg No APP-1020-CEX-102, 1 page, 11X17	HC
16.1 – 16.6.8	Shield Building Lower Annulus Inside Embedments Index Development View Radius 69'-6" (Sheet 4), Dwg No APP-1020-CEX-104, 1 page, 11X17	HC
16.1 – 16.6.9	Standard Embedment Plates Deformed Wire Anchor (DWA) Type, Dwg No APP-CE01-CE-002, 1 page, 11X17	HC
16.2/3	Overall Modules Response status, 11 pages, 8.5 X 11	HC
16.10	RBL (APP), RBL (CPP), Support Qualification, # Supports Qualified by month, 2 pages, 8.5 X 11	HC
17.2	VCS Unit 2 – Construction T/O to Component Test (Waterfall), 13 pages, size 8.5 X 11	HC
17.2.1	VCS Unit 1 - Service Water – Service Water Initial Test Program, 1 page, size 11 X 17	HC
17.3	EDCR Listing – from 4/30/15 to 10/1/2015, 10 pages, 8.5 X 11	HC
17.3.1	CBI EDCR Listing - pages 1 to 108, 8.5 X 11	HC
17.4	WEC – CBI Staffing Summary Table, 1 page, 8.5 X 11	HC
17.5 (2.9)	Weekly ECS Report Out, 9/30/15, 48 pages, 8.5 X 11	HC
17.6	Monthly Engineering Completion Status Meeting, September 9th, 2015, 22 pages, PowerPoint, size 8.5 X 11	HC
17.6.1	Monthly Engineering Completion Status Meeting, October 7, 2015, 24 pages, PowerPoint, size 8.5 X 11	HC
17.7 (2.3)	Level 1 Issue Executive Summary Report, 2 pages, 8.5 X 11	HC
17.8	CB&I 1X4 POs Released, 3 pages,	HC
17.9	CBI To-Go POs, 1 page, 8.5 X 11	HC
17.10	Standard Plant ITAAC 2.3 06.09b.iv Performance Documentation Plan (Doc. No. APP-RNS-ITH-004), 11 pages, size 8.5 X 11	HC
17.10.1	Standard Plant ITAAC 2.2 02.02a Performance Documentation Plan (Doc. No. APP-PCS-ITH-014), 13 pages, size 8.5 X 11	HC
17.10.2	Standard Plant ITAAC 2.1 02.11b.iii Performance and Documentation Plan (Doc No APP-RCS-ITH-048), 12 pages, size 8.5 X 11	HC
17.10.3	Standard Plant ITAAC 2.1 02.08b Performance and Documentation Plan (Doc No APP-RCS-ITH-056), 13 pages, size 8.5 X 11	HC
17.10.4	Standard Plant ITAAC 2.1 02.08d.vii Performance and Documentation Plan (Doc No APP-RCS-ITH-060), 10 pages, size 8.5 X 11	HC
19.2	Work Package Review Task Team, 3 pages, 8.5 X 11	HC

Table A-1. Documents Reviewed During the Assessment		
No.	**Description**	**Hard Copy (HC) or Electronic (E)**
--	CBI AP1000 Strategic Planning Team – Unincorporated DCP Report, 5 pages, 8.5 X 11	HC
--	VCS Monthly Project Review Meeting, September 17, 2015, 156 pages, PowerPoint 8.5 X `11	HC
--	VCS Site Design Engineering Drawing Booklet (1), System P&IDs & Electrical One-lines, 321 pages, 11X17	HC
--	VCS Plan of the Day - 9-9-15, 35 pages	E
--	VC Summer Units 2 & 3 Project Assessment Consortium Meeting (Presentation), dated 9/9/15, (2 Copies), 131 pages, PowerPoint 8.5 X 11	HC
--	VC Summer Nuclear Station Units 2 and 3 Updated Final Safety Analysis Report , Chapter 1 (Rev 3) 8.5 X 11 (Large packet)	HC
--	VC Summer – Site Specific Engineering Schedule – Remaining (Sorted by System /Major Sequence) Data Date: 28-Sep-15, CB&I – 200 pages, 11X17	HC
--	AP1000 Domestic Design Finalization – CBI Std Plant – DOM DF – To GO Engineering, 157 pages, 11X17	HC
--	E&DCR Title: Requalification of KOPEC conduit supports at Elevation 66'-6" Area 2, E&DCR No. APP-1212-GEF-087, Rev 0., 25 pages, 8.5 X 11	HC
--	VC Summer Nuclear Station Units 2 and 3 Updated Final Safety Analysis Report , Chapter 3 (Rev 3) , 8.5 X 11 (Large packet)	HC
--	VCS Schedule - WEC PM Milestones, 4 pages	E
--	VCS Schedule - WEC PM Milestones, 6 pages	E
--	VCS Schedule - Module Assembly Summary, 1 page	E
--	VCS Schedule – Licensing, 44 page	E
--	VCS Schedule - ITAAC Detail, 137 pages	E
--	VCS Level 1 - Construction Schedule, 3 pages	E
--	VCS Schedule - Module Procurement Detail, 8/25/15,55 pages	E
--	VCS Schedule - Module Procurement Summary, 8/25/15, 6 pages	E
--	VCS Schedule - Module Procurement, 51 pages	E
--	VCS Schedule - NAC Detail, 8/30/15,40 pages	E
--	VCS Schedule - NAC Summary, 2 pages	E
--	VCS Schedule – NAC, 8/30/15,53 pages	E
--	VCS Schedule - Panel Delivery Detail, 26 pages	E
--	VCS Schedule - Panel Delivery Summary, 8/25/15,2 pages	E
--	VCS Schedule - Panel Delivery, 8/25/15,26 pages	E
--	VCS Schedule - Procurement Detail, 8/25/15,323 pages	E
--	VCS Schedule - Procurement Summary, 8/25/15, 9 pages	E
--	VCS Schedule - Procurement WES Detail, 8/25/15,158 pages	E

Table A-1. Documents Reviewed During the Assessment		
No.	Description	Hard Copy (HC) or Electronic (E)
--	VCS Schedule - Procurement WES Summary, 8/25/15, 12 pages	E
--	VCS Schedule - Procurement WES, 127 pages	E
--	VCS Schedule – Procurement, 261 pages	E
--	VC Summer EPC Agreement, 5/23/15,176 pages	E
--	Meeting Sign in, Consortium 9-9-15 Presentation , 3 pages	E
--	September 9 Presentation Draft Agenda, 2 pages	E
--	CBI Meeting Schedule – 9-9-1515, 3 pages	E
--	Weekly Site Safety Units 2 and 3 Report 9-21-15 28 pages	E
--	VCSummer Supply Chain Management Org Chart 9-21-15, 1 page	E
--	VCSumer Plan of the Day 9-21-15, 26 pages	E
--	Turbine Building Pipe Summary - Large and Small Bore 1-3-12, 1 page	E
--	Backfill Plan for Nuclear Island, 2 pages	E
--	Aux Building Elevations, 20 pages	E
--	9-21-15 Module Discussion Attendance Sheet, 9/21/15,1 page	E
--	VCS Modules Meeting - 9-15-154 pages	E
--	4-Box Report - Modules - 9-15-15, 42 pages	E
--	VC Summer Plan of the Day 9-22-15, 36 pages	E
--	VC Summer P6 database structure, 1 page	E
--	VC Summer P6 Info, 12 pages	E
--	SCEG Personnel Reporting Up Through Ron Jones, 2 pages	E
--	Construction Performance Meeting 9-13-15, 31 pages	E
--	Org Chart - Confidential - Do Not Share Outside Bechtel, 1 page	E
--	9-14-15 LAR 30 & LAR 111 Schedule, 4 pages	E
--	9-15-15 McIntyre Email on CAP and DCP Status, 2 pages	E
--	9-15-15 ITAAC Letter, 3 pages	E
--	9-17-15 U3 Overview Schedule, 1 page	E
--	9-17-15 U2 Overview Schedule, 1 page	E
--	9-17-15 Monthly Meeting Action Items List, 19 pages	E
--	9-17-15 Monthly Meeting Agenda, 1 page	E
--	2015 09 22 - Bechtel Assessment - Document Request - Tracking Document, 17 pages	E
--	2015 09 22 - Bechtel Assessment - Document Request - Tracking Document (3), 17 pages	E
--	2015 09 04 - Bechtel Assessment - Document Request - Tracking Document-Rev 1 – SG, 17 pages	E
--	2015 08 24 - Bechtel Assessment - Document Request - Tracking Document, 12 pages	E

Table A-1. Documents Reviewed During the Assessment		
No.	**Description**	**Hard Copy (HC) or Electronic (E)**
--	2015 08 18 - Bechtel Assessment - Document Request - Tracking Document, 11 pages	E
--	Bechtel Assessment of V. C. Summer Units 2 & 3 - 8-12-15 Supplemental Request for Schedule Related Information, 2 pages	E
--	2015 08 03 - Bechtel Assessment - Document Request - 8-7-15 Comments, 16 pages	E
--	VCS Document Request List, 2 pages	E
--	2015 09 23 - Bechtel Assessment - Document Request - Tracking Document, 17 pages	E
--	VC Summer aerial photo taken 6-30-15, 1 page	E
--	WEC Engineering Status Meeting 9-25-15, 1 page	E
--	WEC Engineering Follow-up Meeting 9-28-15, 1 page	E
--	VC Summer Plan of the Day 9-24-15, 38 pages	E
--	Work Control Document Control Mtg 9-24-15, 1 page	E
--	VC Summer Plan of the Day 9-23-15, 35 pages	E
--	VCS Schedule – Bab Follow, 45 pages	E
--	VCS Schedule – Engineering Milestones (Gap file), 123 pages	E
--	VCS Schedule – Fab Follow, 48 pages	E
--	VC Summer aerial phot taken 6-30-15, 1 page	E
--	VCS Module Q240, 2 pages	E
--	VCS Module Q233, 3 pages	E
--	VCS Module CA36, 2 pages	E
--	VCS Modules, 7 pages	E
--	VCS - Ctmt Elev 084, 116 pages	E
--	VCS - Ctmt Elev 084 (WBS), 12 pages	E
--	VCS Level 2 - Construction Schedule, 23 pages	E
--	VCS Schedule - Module Assembly Detail, 199 pages	E
--	VCS Schedule - Module Assembly, 8/30/15,163 pages	E
--	VCS Schedule - Testing & Startup Detail, 1289 pages	E
--	VCS Schedule - Testing & Startup Summary, 8/30/15, 8 pages	E
--	VCS Schedule - Construction Site Prep Summary, 3 pages	E
--	VCS Schedule - Construction Site Prep Detail, 233	E
--	VCS Schedule - Testing & Startup, 8/30/15,12 pages	E
--	VCS Schedule - Construction Site Prep, 276 pages	E
--	EDCR-Bechtel Request 10-1-15, 10 pages	E
--	EDCR-Bechtel Request 10-1-15, 7 pages	E
--	VC Summer Plan of the Day 10-7-15, 32 pages	E
--	CBI EDCR Report 10/2/2015, 14 pages	E

Table A-1. Documents Reviewed During the Assessment		
No.	Description	Hard Copy (HC) or Electronic (E)
--	CBI EDCR Report 10/2/2015, 15 pages	E
--	2015 09 30 - Bechtel Assessment - Document Request - Tracking Document, 9/30/15,19 pages	E
--	2015 10 02 Rev1 - Bechtel Assessment - Document Request - Tracking Document, 10/2/15,20 pages	E
--	2015 10 08 - Bechtel Assessment - Document Request - Tracking Document, 10/9/15,37 pages	E
--	VC Summer Plan of the Day, September 29, 2015, 40 pages, PowerPoint 8.5 X 11	HC
--	Civil Generic Guidance Open Items, 12 pages, 11X17	E
--	Straightening Studs, email, 10-13-15, 5 pages, 8.5 X 11	E
--	Non-manual Turnover Rate, email, 10-12-15, 3 pages, 8.5 X 11	E
--	Email Drawings required for Electrical cable tray support, Kelly to Matthews, 9-24-15	E
--	Annex Building Cable Tray Support Area 1, EL. 100'-0" APP-4031-SH-E002, Dwg No APP-4031-WF-E002	HC
--	Annex Building Cable Tray Support Area 1, EL. 100'-0" APP-4031-SH-E002, Dwg No APP-4031-VF-E900	HC
--	Annex Building Cable Tray Support Location Plan Area 1 & Area 4 EL 100'-0" Sheet 3 0f 3, Dwg No APP-4031-SH-014	HC
--	Fabrication Requirements Cope Tray Supports Seismic Category III Trapeze Rod Support Detail, Dwg No APP-SH27-VF-201	HC
--	Annex Building – Area 1 Supplemental Steel Plan @ EL 117-6", Dwg No APP-4041-SA-002	HC
--	Annex Building Cable Tray Support List & Fabrication Details, Area 1 & Area 4, EL 100'-0" SH 3 of 3, Dwg No APP-4031-SHX-01401	HC
--	Annex Building Cable Tray Support List & Fabrication Details Area 1, EL 100'-0" SH 1 of 3, Dwg No APP-4031-SHX-01201	HC
--	Annex Building Cable Tray Support List & Fabrication Details Area 1, EL. 100'-0" SH 2 of 3, Dwg No APP-4031-SHX-01301	HC
--	Annex Building – Area 1 Supplemental Steel Plan @ EL. 117'-6", Dwg No APP-4041-SA-001, 1 page,	HC
--	Annex Building – Area 4 Structural Steel Roof Framing Plan Elevation 117'-1 ½" (LP), Dwg No APP-4044-SS-001, Dwg No APP-4044-SS-001	HC
--	Annex Building – Area 1 Steel Framing Plan @ EL. 117'-6", Dwg No APP-4041-SS-001, 1 page, 11X17	HC
--	CBI Daily Force Report, 10/12/2015, 1 page, 8.5 X 11	E
--	CBI Daily Report, 10/12/2015, 3 pages, 8.5 X 11	E
--	VC Summer Plan of the Day, October 13, 2015, 33 pages, 8.5 X 11	E
--	Document Complexity N-Type EDCRs 10-15-15, 2 pages, 8.5X11	E

Appendix B

Assessment Team Resumes

BECHTEL

INFRASTRUCTURE
MINING & METALS
NUCLEAR, SECURITY & ENVIRONMENTAL
OIL, GAS & CHEMICALS

Richard L. Miller

Manager of Operations
Assessment Team Leader

Technical Qualifications

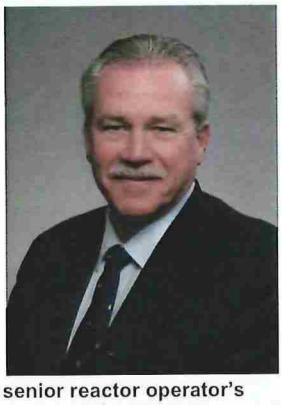
- Senior Reactor Operator's License No. 20411

Education

- Executive Management Certificate, Vanderbilt University
- B.S., Mechanical Engineering, North Carolina State University

Memberships

- Member, American Nuclear Society Board, Operations and Power Division
- Member, American Nuclear Society



Dick Miller is a degreed mechanical engineer with over 38 years of nuclear engineering, construction, and project management experience. Currently he is the Operations Manager for Nuclear Power, responsible for the successful execution of Bechtel's nuclear power projects worldwide, as well as leading a senior executive team performing an assessment of the status of the V.C. Summer Units 2 & 3 new builds. He has unparalleled experience as a project manager, overseeing numerous highly successful Steam Generator and Reactor Pressure Vessel Replacement (SGR/RPVHR) projects, including the world record for shortest duration at Comanche Peak Unit 1 and the Ginna SGR, which was the first to use the "through-the-dome" methodology. He is an enthusiastic, committed leader who focuses on providing executive oversight, technical guidance for the successful planning and implementation of projects, and close collaboration between clients and Bechtel to ensure project success. Prior to joining Bechtel, Dick worked for a southeast electric utility at one of the company's nuclear power plants, holding a senior reactor operator's license and managing the utility's maintenance department. Since joining Bechtel, Dick has spent the majority of his career on field assignments across the United States, managing or directing over 20 major modification projects at nuclear power facilities.

Manager of Operations, Nuclear Power

2014–Present: Mr. Miller is responsible for all nuclear projects and services worldwide, as well as the development of new opportunities both domestic and foreign, including the completion of Watts Bar Unit 2 and the Davis-Besse SGR and Wolf Creek Pipe Replacement projects, as well as the commencement of the Beaver Valley Unit 2 SGR. Currently, he is leading a senior executive team performing an assessment study of the status, challenges, and opportunities of the new build AP1000 units at V.C. Summer for the owner.

Senior Project Director, Nuclear Power, Bechtel Power Corporation

2011–2014: Mr. Miller was responsible for the successful implementation of nuclear power projects, including the NextEra EPUs, as well as proposal development and client communications. He also managed Bechtel's efforts related to the Fukushima incident, including staffing and sponsorship of Bechtel employees on the Fukushima Industry Support Team in Tokyo and representation of Bechtel in Tokyo during business development efforts. In addition, he oversaw the Crystal River Unit 3 Containment Repair Project, including management of the Phase 1 engineering and development effort and EPC contract negotiations.

Senior Project Director/Project Manager, SONGS SGR, Bechtel Power Corp.

2010–2011: Mr. Miller was responsible for the successful completion of the SONGS Unit 3 lump-sum SGR, which was completed within budget and ahead of schedule.

Senior Project Director, Nuclear Power, Bechtel Power Corp.

2007–2010: Mr. Miller was responsible for proposal development activities and contract negotiations for numerous SGR, RPVHR, and EPU projects. Significantly, he oversaw the negotiation and implementation of the NextEra Fleet EPU Project, a major multi-billion dollar effort to perform EPUs on six units (Point Beach 1 & 2, St. Lucie 1 & 2, and Turkey Point 3 & 4). This project earned the Business Development Project of the Year Award for the entire Bechtel Corporation.

Senior Project Manager, Beaver Valley Unit 1 SGR/RPVHR and Comanche Peak Unit 1 SGR, Bechtel Power Corp.

2004–2007: Mr. Miller was responsible for the successful completion of the SGR/RPVHR project for FirstEnergy's Beaver Valley Unit 1. This project was named runner-up for Pennwell's Project of the Year at

the Power Generation Conference. As PM for Comanche Peak Unit 1, he led the team that set the world record for shortest schedule of a SGR, and this project was named runner-up for Bechtel's Project of the Year.

Senior Project Manager, Davis-Besse, North Anna, and Surry RPVHRs, Bechtel Power Corp.

2002–2003: Mr. Miller was responsible for the successful execution of head replacement projects at North Anna Units 1 and 2, Surry Units 1 and 2, and Davis-Besse.

Operations Manager, Nuclear Power, Bechtel Power Corp.

2000–2002: Mr. Miller was responsible for the major modification operations of Bechtel's nuclear power business line, and he oversaw the successful completion of the Kewaunee and South Texas Project Unit 2 SGRs. In addition, during this time he took over as Project Manager to complete the D.C. Cook SGR. He was also responsible for the completion of the commercial closeout of the Arkansas Nuclear One Unit 1 SGR.

Manager of Decommissioning, Bechtel Power Corp.

1998–2000: Mr. Miller was responsible for the decontamination and decommissioning business line activities, including Connecticut Yankee and SONGS 1 Large Component Removal.

Project Manager, Tihange Unit 3 SGR

1997–1998: Mr. Miller was responsible, as a self-employed project management consultant, for the management of the Tihange SGR in Belgium.

Project Manager, LaSalle Modifications, Bechtel Power Corp.

1996–1997: Mr. Miller was responsible for the management and installation of modifications at the LaSalle nuclear plant.

Project Manager, Ginna SGR, Bechtel Power Corp.

1993–1996: Mr. Miller was responsible for the management and implementation of the lump sum EPC contract for Ginna's SGR. Additionally, he served as Proposal Manager for several lump sum SGR and major modification proposals.

Project Manager, North Anna Unit 1 SGR, Bechtel Power Corp.

1990–1993: Mr. Miller was responsible for the management and implementation of the lump sum EPC contract for North Anna 1's SGR.

Deputy Project Manager, Indian Point Unit 3 SGR, Bechtel Power Corp. and Manager, Bechtel-KWU Alliance

1988–1990: Mr. Miller assisted the implementation of the Indian Point 3 SGR, as well as prepared proposals and managed awarded conceptual studies for other SGRs and major modifications. Additionally, he was responsible for the Bechtel-KWU Alliance activities.

Senior Reactor Operator/Maintenance Supervisor/Principal Engineer, H.B. Robinson Nuclear Power Plant

1979–1988: Mr. Miller served as Principal Engineer at H.B. Robinson, during which time a SGR was performed, as well as serving as Outage Manager for refueling outages and Maintenance Supervisor for mechanical maintenance. Additionally, he received his Senior Reactor Operator License and authored the Outage Management Manual, the nuclear industry's first, which received an INPO Good Practice award.

Field Service Engineer, Westinghouse Electric Corp.

1977–1979: Mr. Miller was responsible for the erection and inspection of equipment at numerous nuclear power plants under construction.

U.S. Marine Corps, E-5

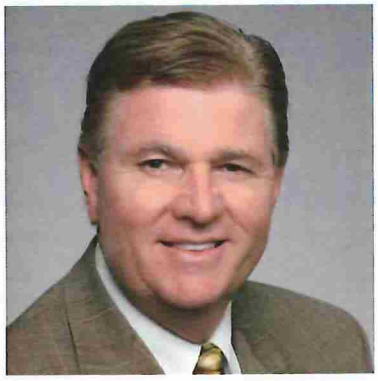
1971–1973: Mr. Miller received an honorable discharge in 1973.

BECHTEL

INFRASTRUCTURE
MINING & METALS
NUCLEAR, SECURITY & ENVIRONMENTAL
OIL, GAS & CHEMICALS

Carl W. Rau

Executive Sponsor



Over his 44 year Bechtel career, Carl has served various business lines and corporate functions in project management and executive leadership roles. He is a true leader with unmatched mega-project construction experience that ranges from nuclear power plants to industrial facilities. He also brings an international perspective from his roles overseeing projects around the globe, as well as a thorough understanding of the commercial aspects of large project development and execution. Additionally, he has a broad knowledge of effective and proven processes and procedures, along with a unique ability to motivate those around him.

Education

- AA, Civil Engineering, Penn State University
- Certificate, Business Management, California Coast University

Manager, Special Projects, Bechtel

2012–2015: Mr. Rau served in an executive position leading specialized projects and studies in support of Bechtel's Nuclear, Security, and Environmental and Infrastructure global business units.

President, Nuclear Power

2008–2012: Mr. Rau led the Nuclear Power business line, managing all of Bechtel's global nuclear power activities, including project development, execution, and services. During his tenure, he oversaw numerous project awards and successful executions which significantly grew the nuclear power portfolio, including extended power uprates on six units, steam generator replacements, Watts Bar Unit 2 completion, engineering services at multiple plants, and permitting, licensing, and design for advanced reactor projects.

Manager of EPC Functions, Bechtel Group

2006–2008: Mr. Rau was responsible for all the functional departments of the Bechtel group of companies, ensuring that all world-wide projects and corporate functions were appropriately staffed and processes / procedures were followed.

Executive Vice President – London Operations for Oil, Gas & Chemicals (OG&C)

2005–2006: In this capacity, Mr. Rau oversaw OG&C's London office and Center of Excellence, which was responsible for executing, deploying personnel, and providing technical support for the OG&C global business unit's operations in Europe, Africa, the Middle East, and Asia.

President, Bechtel Infrastructure Corporation (BINFRA)

2004–2005: As BINFRA President, Mr. Rau was responsible for planning, executing, and managing civil infrastructure projects in North and South America, supporting both public and private sector customers.

Executive Vice President, Bechtel Systems & Infrastructure, Inc. (BSII)

2003–2004: Mr. Rau was responsible for the oversight of Bechtel's U.S. Government business, primarily with the Department of Energy and the Department of Defense, specializing in large, complex projects in the areas of defense, space, energy, national security, and the environment.

Manager of Central Functions, Bechtel Group

2002–2003: Mr. Rau was responsible for all the functional departments of the Bechtel group of companies, ensuring that all world-wide projects and corporate functions were appropriately staffed and processes / procedures were followed.

Frederick Execution Unit Manager, Bechtel Power and BSII

2000–2002: Mr. Rau was responsible for all personnel at the Frederick, Maryland Execution Unit office and Center of Excellence, which was responsible for winning and executing work for both the power and government services business units. In 2000, he was elected Senior Vice President.

Corporate Manager of Construction and President of Bechtel Construction Operations Incorporated (BCOI)

1999–2000: Mr. Rau was responsible for all construction personnel world-wide in the Bechtel group of companies, as well as construction execution through BCOI.

Manager of Operations, Europe, Africa, and Middle East

1998–1999: In this capacity, Mr. Rau ensured the effective execution of all Bechtel projects underway in Europe, Africa, and the Middle East, as well as providing support for Bechtel businesses and business development efforts.

Project Director, Dabhol Power Station Project

1999–1999: During his tenure as Manager of Operations, Mr. Rau served as the Project Director for the Bechtel/GE consortium that performed EPCS services for this 2,240 MW combined cycle power project in India (at the time the largest foreign investment in India).

Project Director, Jamnagar Refinery Project

1997–1998: Mr. Rau led the effort to design, build, and commission this massive refinery complex (the largest in the world), which covers 7,500 acres and consists of manufacturing and allied facilities, utilities, off-sites, port facilities, and housing for 2,500 employees. In 1998, he was elected a Principal Vice President.

Manager of Power Operations, Europe, Africa, and Middle East

1996–1997: Mr. Rau ensured the effective execution of all Bechtel power projects underway in Europe, Africa, and the Middle East, as well as providing support for Bechtel businesses and business development efforts.

Executive Assistant to the President, Bechtel Power

1994–1996: Mr. Rau supported the President of Bechtel Power to ensure the effective execution of projects, handling both technical and commercial issues, as well as business development efforts and customer engagement.

Manager of Power Operations, South Korea

1993–1994: Mr. Rau ensured the effective execution of all Bechtel power projects underway in South Korea, as well as providing support for Bechtel businesses and business development efforts.

Project Manager, Comanche Peak 1 & 2 Completion Project

1989–1993: Mr. Rau began as the Project Completion Manager of Comanche Peak 1 nuclear power station, which Bechtel took over from the previous contractor who had failed to complete the project. He was then seconded to the utility owner's organization and was responsible for planning and executing the Unit 2 completion. He successfully led both units to completion, as well as serving as an expert witness for Unit 2 rate case on behalf of the utility.

Mechanical Discipline Manager/Project Completion Manager, Vogtle Nuclear Generating Station

1985–1989: Mr. Rau was responsible for all mechanical work, including management of contractors. This included responsibility for piping, reactor internals, insulation, turbine erection, and fire protection system installation. He supervised a Georgia Power mechanical discipline organization of 2,000 non-manual employees and functioned as Bechtel's senior construction representative responsible for 100+ construction engineers in all disciplines.

Various Field Roles, Nuclear Power Projects

1971–1985: Mr. Rau served in a variety of nuclear power plant construction field roles for Bechtel, including:

- System Completion Manager/Lead Piping Superintendent/Drywell CRD Area Superintendent/HVAC Coordinator — Hope Creek Generating Station
- Lead Piping Superintendent/Piping Superintendent/Assistant Project Field Engineer/Startup Superintendent/ Lead Piping/Mechanical Engineer/Area III Lead Piping Engineer — Susquehanna Steam Electric Station
- Civil Field Engineer — Calvert Cliffs Nuclear Power Plant

Construction Engineer, U.S. Steel Corporation

1968–1971: Mr. Rau served as the survey crew party chief responsible for all field control and construction surveys, as well as a field engineer responsible for all aspects of construction at the soaking facility.